THERMAL DYNAMICS®

INPUT VOLTAGE
24V DC

iCNC PERFORMANCE CNC CONTROLLER

Operator Manual

CE

C ETL US LISTED
Intertek
3163339

Revision: AA	Issue Date: August 19, 2015	Manual No.: 0-5399

Thermal-Dynamics.com

WE APPRECIATE YOUR BUSINESS!

Congratulations on your new Thermal Dynamics product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry. This product is backed by our extensive warranty and world-wide service network. To locate your nearest distributor or service agency call 1-800-752-7622, or visit us on the web at **www.thermal-dynamics.com.**

This Service Manual has been designed to instruct you on the correct use and operation of your Thermal Dynamics product. Your satisfaction with this product and its safe operation is our ultimate concern. Therefore please take the time to read the entire manual, especially the Safety Precautions. They will help you to avoid potential hazards that may exist when working with this product.

YOU ARE IN GOOD COMPANY!

The Brand of Choice for Contractors and Fabricators Worldwide.

Thermal Dynamics is a Global Brand of manual and automation Plasma Cutting Products.

We distinguish ourselves from our competition through market-leading, dependable products that have stood the test of time. We pride ourselves on technical innovation, competitive prices, excellent delivery, superior customer service and technical support, together with excellence in sales and marketing expertise.

Above all, we are committed to developing technologically advanced products to achieve a safer working environment within the welding industry

WARNING
Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment.
While the information contained in this Manual represents the Manufacturer's best judgement, the Manufacturer assumes no liability for its use.

iCNC Performance
Operator Manual No. 0-5399

Published by:
Thermal Dynamics Corporation.
2800 Airport Rd.
Denton, Texas 76207

www.thermal-dynamics.com

© Copyright 2013, 2014, 2015 by
Thermal Dynamics Corporation.

All rights reserved.

Reproduction of this work, in whole or in part, without written permission of the publisher is prohibited.

The publisher does not assume and hereby disclaims any liability to any party for any loss or damage caused by any error or omission in this manual, whether such error results from negligence, accident, or any other cause.

Publication Date: August 19, 2015
Revision Date:

Record the following information for Warranty purposes:

Where Purchased: _____

Purchase Date:_____

Power Supply Serial #:_____

Torch Serial #:_____

Be sure this information reaches the operator.
You can get extra copies through your supplier.

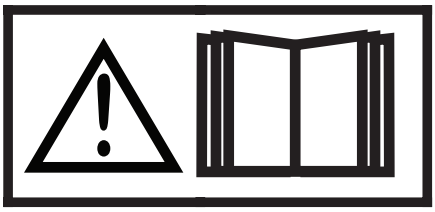
CAUTION

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding and cutting equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding, Cutting, and Gouging," Booklet 0-5407. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Malfunctioning or poorly maintained equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a telephone or written request for service advice be made to the Authorized Distributor from whom it was purchased.

This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.



READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.
PROTECT YOURSELF AN D OTHERS!

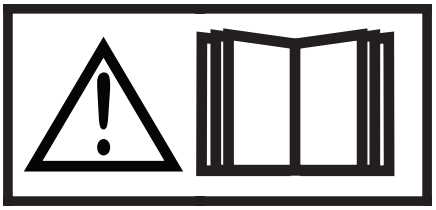
ASSUREZ-VOUS QUE CETTE INFORMATION EST DISTRIBUÉE À L'OPÉRATEUR.
VOUS POUVEZ OBTENIR DES COPIES SUPPLÉMENTAIRES CHEZ VOTRE FOURNISSEUR.

ATTENTION

Les INSTRUCTIONS suivantes sont destinées aux opérateurs qualifiés seulement. Si vous n'avez pas une connaissance approfondie des principes de fonctionnement et des règles de sécurité pour le soudage à l'arc et l'équipement de coupage, nous vous suggérons de lire notre brochure « Precautions and Safe Practices for Arc Welding, Cutting and Gouging, » Brochure 0-5407. Ne permettez PAS aux personnes non qualifiées d'installer, d'opérer ou de faire l'entretien de cet équipement. Ne tentez PAS d'installer ou d'opérer cet équipement avant de lire et de bien comprendre ces instructions. Si vous ne comprenez pas bien les instructions, communiquez avec votre fournisseur pour plus de renseignements. Assurez-vous de lire les Règles de Sécurité avant d'installer ou d'opérer cet équipement.

RESPONSABILITÉS DE L'UTILISATEUR

Cet équipement opérera conformément à la description contenue dans ce manuel, les étiquettes d'accompagnement et/ou les feuillets d'information si l'équipement est installé, opéré, entretenu et réparé selon les instructions fournies. Vous devez faire une vérification périodique de l'équipement. Ne jamais utiliser un équipement qui ne fonctionne pas bien ou n'est pas bien entretenu. Les pièces qui sont brisées, usées, déformées ou contaminées doivent être remplacées immédiatement. Dans le cas où une réparation ou un remplacement est nécessaire, il est recommandé par le fabricant de faire une demande de conseil de service écrite ou par téléphone chez le Distributeur Autorisé de votre équipement.
Cet équipement ou ses pièces ne doivent pas être modifiés sans permission préalable écrite par le fabricant. L'utilisateur de l'équipement sera le seul responsable de toute défaillance résultant d'une utilisation incorrecte, un entretien fautif, des dommages, une réparation incorrecte ou une modification par une personne autre que le fabricant ou un centre de service désigné par le fabricant.



ASSUREZ-VOUS DE LIRE ET DE COMPRENDRE LE MANUEL D'UTILISATION AVANT D'INSTALLER OU D'OPÉRER L'UNITÉ.

PROTÉGEZ-VOUS ET LES AUTRES!

This Page Intentionally Blank

TABLE OF CONTENTS

SECTION 1: SAFETY 1-1

1.01 Safety Precautions - ENGLISH 1-1
1.02 Précautions de sécurité - FRENCH CANADIAN 1-6

SECTION 2: SPECIFICATIONS 2-1

2.1 System Description 2-1
2.2 Specification 2-1

SECTION 3: OPERATION 3-1

3.1 Overview Main Screen 3-1
3.2 Process Selection / Plasma and Gas 3-6
3.3 Front Panel Buttons 3-8
3.4 ON/OFF Button Descriptions and Functions 3-11
3.5 Auxiliary Button Descriptions and Functions 3-11
3.6 Plasma Button Descriptions and Functions 3-12
3.7 Oxyfuel Button Descriptions and Functions 3-13
3.8 Starting Procedure 3-14
3.9 Homing Procedure 3-15
3.10 Jog 3-15
3.11 Parameter Quick View 3-16
3.12 How To Proceed When Something Happens 3-17
3.14 Advanced Process Selection Features 3-20

SECTION 4: iHC 4-1

4.1 Pierce/Cut Sequense 4-1
4.2 iHC User Interface 4-2
4.3 Main Settings 4-4
4.4 System Setup & Diagnostic Menus 4-5

SECTION 5: NEST 5-1

5.1 ProMotion® Nest 5-1
5.2 Toolbar 5-3
5.3 Toolbar Functions 5-4
5.4 File Menu 5-20
5.5 View Menu 5-22
5.6 Tools Menu 5-23
5.7 Marking 5-28
5.8 Autonest 5-29
5.9 Cutting 5-31
5.10 Special Tools 5-34
5.11 Ruler 5-37
5.12 Options Menu 5-38
5.13 ESSI Options 5-40
5.14 EIA input Options 5-42
5.15 EIA Ouput Options 5-43
5.16 Nesting Options 5-45
5.17 Language Options 5-46
5.18 Registration Menu 5-46
5.19 Help Menu 5-46
5.20 List Windows 5-46
5.21 Miscellaneous 5-48

TABLE OF CONTENTS

SECTION 6: MAINTENANCE AND TROUBLESHOOTING 6-1

6.1 Maintenance 6-1
6.2 Cut Quality 6-1
6.3 Oxy fuel cutting quality 6-2
6.4 Troubleshooting 6-4
6.5 Replacement parts 6-6

Declaration of Conformity

We **Thermal Dynamics**

of **2800 Airport Road**
Denton, TX 76207 U.S.A.

CE

in accordance with the following Directive(s):

2006/95/EC The Low Voltage Directive

2004/108/EC The Electromagnetic Compatibility Directive

hereby declare that:

Equipment: Plasma Cutting CNC Controller

Model Name/Number: iCNC Performance

Market Release Date: August 19, 2015

is in conformity with the applicable requirements of the following harmonized standards:

Conforms to requirements of IEC 61326-1:2012

IEC 61000-4-2: 2008, Electro Static Discharge Immunity

IEC 61000-4-3:2006 +A1:2007 +A2:2010, Radiated, Radio-Frequency, Electromagnetic Immunity

IEC 61000-4-4:2012, Electrical Fast Transient/Burst Immunity

IEC 61000-4-6: 2008, Conducted Radio-Frequency Electromagnetic Immunity

IEC 61000-4-8:2009, Power Frequency Magnetic Field Immunity

CISPR 11:2009 +A1:2010, AC Mains Conducted Emissions

CISPR 11:2009 +A1:2010, Radiated Emissions

Meets IEC 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

Classification: The equipment described in this document is **Class A** *and intended for industrial use.*

WARNING
This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radiated disturbances.

Manufacturer's Authorized Representative

Steve Ward V.P. Europe and General Manager

Address:Victor Technologies International Inc.
Europa Building
Chorley N Industrial Park
Chorley, Lancashire,
England PR6 7BX

Date: August 19, 2015

(Signature)

Steve Ward
Full Name

V.P. Europe and General Manager
(Position)

WARNING

This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radiated disturbances.

SECTION 1: SAFETY

1.01 Safety Precautions - ENGLISH

WARNING: These Safety Precautions are for your protection. They summarize precautionary information from the references listed in Additional Safety Information section. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.

PROTECT YOURSELF AND OTHERS -- Some welding, cutting, and gouging processes are noisy and require ear protection. The arc, like the sun, emits ultraviolet (UV) and other radiation and can injure skin and eyes. Hot metal can cause burns. Training in the proper use of the processes and equipment is essential to prevent accidents. Therefore:

1. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields, and goggles are also required.
2. Use a face shield fitted with the correct filter and cover plates to protect your eyes, face, neck, and ears from sparks and rays of the arc when operating or observing operations. Warn bystanders not to watch the arc and not to expose themselves to the rays of the electric-arc or hot metal.
3. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap for hair protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
4. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned, and open pockets eliminated from the front of clothing.
5. Protect other personnel from arc rays and hot sparks with a suitable non-flammable partition or curtains.
6. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly far. Bystanders should also wear goggles over safety glasses.

FIRES AND EXPLOSIONS -- Heat from flames and arcs can start fires. Hot slag or sparks can also cause fires and explosions. Therefore:

1. Remove all combustible materials well away from the work area or cover the materials with a protective non-flammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings, paper, etc.
2. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire or fires on the floor below. Make certain that such openings are protected from hot sparks and metal.“
3. Do not weld, cut or perform other hot work until the work piece has been completely cleaned so that there are no substances on the work piece which might produce flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
4. Have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket, or portable fire extinguisher. Be sure you are trained in its use.
5. Do not use equipment beyond its ratings. For example, overloaded welding cable can overheat and create a fire hazard.
6. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
7. For additional information, refer to NFPA Standard 51B, “Fire Prevention in Use of Cutting and Welding Processes”, available from the National Fire Protection Association, Battery march Park, Quincy, MA 02269.

ELECTRICAL SHOCK -- Contact with live electrical parts and ground can cause severe injury or death. DO NOT use AC welding current in damp areas, if movement is confined, or if there is danger of falling.

1. Be sure the power source frame (chassis) is connected to the ground system of the input power.
2. Connect the work piece to a good electrical ground.
3. Connect the work cable to the work piece. A poor or missing connection can expose you or others to a fatal shock.
4. Use well-maintained equipment. Replace worn or damaged cables.
5. Keep everything dry, including clothing, work area, cables, torch/electrode holder, and power source.
6. Make sure that all parts of your body are insulated from work and from ground.
7. Do not stand directly on metal or the earth while working in tight quarters or a damp area; stand on dry boards or an insulating platform and wear rubber-soled shoes.
8. Put on dry, hole-free gloves before turning on the power.
9. Turn off the power before removing your gloves.
10. Refer to ANSI/ASC Standard Z49.1 (listed on next page) for specific grounding recommendations. Do not mistake the work lead for a ground cable.

ELECTRIC AND MAGNETIC FIELDS — May be dangerous. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines. Therefore:

1. Welders having pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
2. Exposure to EMF may have other health effects which are unknown.
3. Welders should use the following procedures to minimize exposure to EMF:
   A. Route the electrode and work cables together. Secure them with tape when possible.
   B. Never coil the torch or work cable around your body.
   C. Do not place your body between the torch and work cables. Route cables on the same side of your body.
   D. Connect the work cable to the work piece as close as possible to the area being welded.
   E. Keep welding power source and cables as far away from your body as possible.

FUMES AND GASES -- Fumes and gases, can cause discomfort or harm, particularly in confined spaces. Do not breathe fumes and gases. Shielding gases can cause asphyxiation.

Therefore:

1. Always provide adequate ventilation in the work area by natural or mechanical means. Do not weld, cut, or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes from these materials.
2. Do not operate near degreasing and spraying operations. The heat or arc rays can react with chlorinated hydrocarbon vapors to form phosgene, a highly toxic gas, and other irritant gases.
3. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
4. Refer to ANSI/ASC Standard Z49.1 (see listing below) for specific ventilation recommendations.
5. WARNING: This product contains chemicals, including lead, known to the State of California to cause birth defects and other reproductive harm. Wash hands after handling.

CYLINDER HANDLING -- Cylinders, if mishandled, can rupture and violently release gas. Sudden rupture of cylinder, valve, or relief device can injure or kill. Therefore:

1. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting regulator to a compressed gas cylinder.
2. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, walls, post, or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
3. When not in use, keep cylinder valves closed. Have valve protection cap in place if regulator is not connected. Secure and move cylinders by using suitable hand trucks. Avoid rough handling of cylinders.
4. Locate cylinders away from heat, sparks, and flames. Never strike an arc on a cylinder.
5. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

EQUIPMENT MAINTENANCE -- Faulty or improperly maintained equipment can cause injury or death. Therefore:

1. Always have qualified personnel perform the installation, troubleshooting, and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.
3. Maintain cables, grounding wire, connections, power cord, and power supply in safe working order. Do not operate any equipment in faulty condition.
4. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.
5. Keep all safety devices and cabinet covers in position and in good repair.
6. Use equipment only for its intended purpose. Do not modify it in any manner.

ADDITIONAL SAFETY INFORMATION -- For more information on safe practices for electric arc welding and cutting equipment, ask your supplier for a copy of "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

The following publications, which are available from the American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, are recommended to you:

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting".
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding".
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting".
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting".
5. AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding".
6. AWS C5.6 - "Recommended Practices for Gas Metal Arc Welding".
7. AWS SP - "Safe Practices" - Reprint, Welding Handbook.
8. ANSI/AWS F4.1, "Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances."
9. CSA Standard - W117.2 = Safety in Welding, Cutting and Allied Processes.

Meaning of symbols - As used throughout this manual: Means Attention! Be Alert! Your safety is involved.

DANGER	**Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.**
CAUTION	**Means potential hazards which could result in personal injury or loss of life.**
WARNING	**Means hazards which could result in minor personal injury.**

Enclosure Class

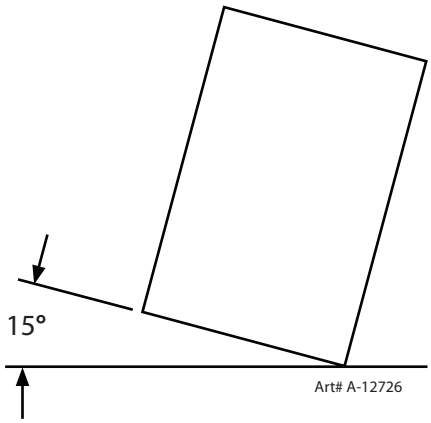
The IP code indicates the enclosure class, i.e. the degree of protection against penetration by solid objects or water. Protection is provided against touch with a finger, penetration of solid objects greater than 12mm and against spraying water up to 60 degrees from vertical. Equipment marked IP21S may be stored, but is not intended to be used outside during precipitation unless sheltered.

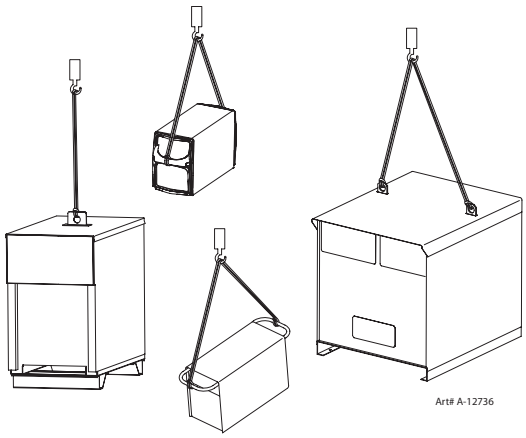
CAUTION

This product is solely intended for plasma cutting. Any other use may result in personal injury and / or equipment damage.

CAUTION

If equipment is placed on a surface that slopes more than 15°, toppling over may occur. Personal injury and / or significant damage to equipment is possible.





CAUTION

To avoid personal injury and/or equipment damage, lift using method and attachment points shown here.

This Page Intentionally Blank

1.02 Précautions de sécurité - FRENCH CANADIAN

AVERTISSEMENT : Ces règles de sécurité ont pour but d'assurer votre protection. Ils récapitulent les informations de précaution provenant des références dans la section des Informations de sécurité supplémentaires. Avant de procéder à l'installation ou d'utiliser l'unité, assurez-vous de lire et de suivre les précautions de sécurité ci-dessous, dans les manuels, les fiches d'information sur la sécurité du matériel et sur les étiquettes, etc. Tout défaut d'observer ces précautions de sécurité peut entraîner des blessures graves ou mortelles.

PROTÉGEZ-VOUS -- Les processus de soudage, de coupage et de gougeage produisent un niveau de bruit élevé et exige l'emploi d'une protection auditive. L'arc, tout comme le soleil, émet des rayons ultraviolets en plus d'autre rayons qui peuvent causer des blessures à la peau et les yeux. Le métal incandescent peut causer des brûlures. Une formation reliée à l'usage des processus et de l'équipement est essentielle pour prévenir les accidents. Par conséquent:

1. Portez des lunettes protectrices munies d'écrans latéraux lorsque vous êtes dans l'aire de travail, même si vous devez porter un casque de soudeur, un écran facial ou des lunettes étanches.
2. Portez un écran facial muni de verres filtrants et de plaques protectrices appropriées afin de protéger vos yeux, votre visage, votre cou et vos oreilles des étincelles et des rayons de l'arc lors d'une opération ou lorsque vous observez une opération. Avertissez les personnes se trouvant à proximité de ne pas regarder l'arc et de ne pas s'exposer aux rayons de l'arc électrique ou le métal incandescent.
3. Portez des gants ignifugiés à crispin, une chemise épaisse à manches longues, des pantalons sans rebord et des chaussures montantes afin de vous protéger des rayons de l'arc, des étincelles et du métal incandescent, en plus d'un casque de soudeur ou casquette pour protéger vos cheveux. Il est également recommandé de porter un tablier ininflammable afin de vous protéger des étincelles et de la chaleur par rayonnement.
4. Les étincelles et les projections de métal incandescent risquent de se loger dans les manches retroussées, les rebords de pantalons ou les poches. Il est recommandé de garder boutonnés le col et les manches et de porter des vêtements sans poches en avant.
5. Protégez toute personne se trouvant à proximité des étincelles et des rayons de l'arc à l'aide d'un rideau ou d'une cloison ininflammable.
6. Portez des lunettes étanches par dessus vos lunettes de sécurité lors des opérations d'écaillage ou de meulage du laitier. Les écailles de laitier incandescent peuvent être projetées à des distances considérables. Les personnes se trouvant à proximité doivent également porter des lunettes étanches par dessus leur lunettes de sécurité.

INCENDIES ET EXPLOSIONS -- La chaleur provenant des flammes ou de l'arc peut provoquer un incendie. Le laitier incandescent ou les étincelles peuvent également provoquer un incendie ou une explosion. Par conséquent :

1. Éloignez suffisamment tous les matériaux combustibles de l'aire de travail et recouvrez les matériaux avec un revêtement protecteur ininflammable. Les matériaux combustibles incluent le bois, les vêtements, la sciure, le gaz et les liquides combustibles, les solvants, les peintures et les revêtements, le papier, etc.
2. Les étincelles et les projections de métal incandescent peuvent tomber dans les fissures dans les planchers ou dans les ouvertures des murs et déclencher un incendie couvant à l'étage inférieur Assurez-vous que ces ouvertures sont bien protégées des étincelles et du métal incandescent.
3. N'exécutez pas de soudure, de coupe ou autre travail à chaud avant d'avoir complètement nettoyé la surface de la pièce à traiter de façon à ce qu'il n'ait aucune substance présente qui pourrait produire des vapeurs inflammables ou toxiques. N'exécutez pas de travail à chaud sur des contenants fermés car ces derniers pourraient exploser.
4. Assurez-vous qu'un équipement d'extinction d'incendie est disponible et prêt à servir, tel qu'un tuyau d'arrosage, un seau d'eau, un seau de sable ou un extincteur portatif. Assurez-vous d'être bien instruit par rapport à l'usage de cet équipement.

5. Assurez-vous de ne pas excéder la capacité de l'équipement. Par exemple, un câble de soudage surchargé peut surchauffer et provoquer un incendie.
6. Une fois les opérations terminées, inspectez l'aire de travail pour assurer qu'aucune étincelle ou projection de métal incandescent ne risque de provoquer un incendie ultérieurement. Employez des guetteurs d'incendie au besoin.
7. Pour obtenir des informations supplémentaires, consultez le NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", disponible au National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

CHOC ÉLECTRI QUE -- Le contact avec des pièces électriques ou les pièces de mise à la terre sous tension peut causer des blessures graves ou mortelles. NE PAS utiliser un courant de soudage c.a. dans un endroit humide, en espace restreint ou si un danger de chute se pose.

1. Assurez-vous que le châssis de la source d'alimentation est branché au système de mise à la terre de l'alimentation d'entrée.
2. Branchez la pièce à traiter à une bonne mise de terre électrique.
3. Branchez le câble de masse à la pièce à traiter et assurez une bonne connexion afin d'éviter le risque de choc électrique mortel.
4. Utilisez toujours un équipement correctement entretenu. Remplacez les câbles usés ou endommagés.
5. Veillez à garder votre environnement sec, incluant les vêtements, l'aire de travail, les câbles, le porteélectrode/torche et la source d'alimentation.
6. Assurez-vous que tout votre corps est bien isolé de la pièce à traiter et des pièces de la mise à la terre.
7. Si vous devez effectuer votre travail dans un espace restreint ou humide, ne tenez vous pas directement sur le métal ou sur la terre; tenez-vous sur des planches sèches ou une plate-forme isolée et portez des chaussures à semelles de caoutchouc.
8. Avant de mettre l'équipement sous tension, isolez vos mains avec des gants secs et sans trous.
9. Mettez l'équipement hors tension avant d'enlever vos gants.
10. Consultez ANSI/ASC Standard Z49.1 (listé à la page suivante) pour des recommandations spécifiques concernant les procédures de mise à la terre. Ne pas confondre le câble de masse avec le câble de mise à la terre.

CHAMPS ÉLECTRIQUES ET MAGNÉTIQUES — comportent un risque de danger. Le courant électrique qui passe dans n'importe quel conducteur produit des champs électriques et magnétiques localisés. Le soudage et le courant de coupage créent des champs électriques et magnétiques autour des câbles de soudage et l'équipement. Par conséquent :

1. Un soudeur ayant un stimulateur cardiaque doit consulter son médecin avant d'entreprendre une opération de soudage. Les champs électriques et magnétiques peuvent causer des ennuis pour certains stimulateurs cardiaques.
2. L'exposition à des champs électriques et magnétiques peut avoir des effets néfastes inconnus pour la santé.
3. Les soudeurs doivent suivre les procédures suivantes pour minimiser l'exposition aux champs électriques et magnétiques :
   A. Acheminez l'électrode et les câbles de masse ensemble. Fixez-les à l'aide d'une bande adhésive lorsque possible.
   B. Ne jamais enrouler la torche ou le câble de masse autour de votre corps.
   C. Ne jamais vous placer entre la torche et les câbles de masse. Acheminez tous les câbles sur le même côté de votre corps.
   D. Branchez le câble de masse à la pièce à traiter le plus près possible de la section à souder.
   E. Veillez à garder la source d'alimentation pour le soudage et les câbles à une distance appropriée de votre corps.

LES VAPEURS ET LES GAZ -- peuvent causer un malaise ou des dommages corporels, plus particulièrement dans les espaces restreints. Ne respirez pas les vapeurs et les gaz. Le gaz de protection risque de causer l'asphyxie.

Par conséquent :

1. Assurez en permanence une ventilation adéquate dans l'aire de travail en maintenant une ventilation naturelle ou à l'aide de moyens mécanique. N'effectuez jamais de travaux de soudage, de coupage ou de gougeage sur des matériaux tels que l'acier galvanisé, l'acier inoxydable, le cuivre, le zinc, le plomb, le berylliym ou le cadmium en l'absence de moyens mécaniques de ventilation efficaces. Ne respirez pas les vapeurs de ces matériaux.
2. N'effectuez jamais de travaux à proximité d'une opération de dégraissage ou de pulvérisation. Lorsque la chaleur ou le rayonnement de l'arc entre en contact avec les vapeurs d'hydrocarbure chloré, ceci peut déclencher la formation de phosgène ou d'autres gaz irritants, tous extrêmement toxiques.
3. Une irritation momentanée des yeux, du nez ou de la gorge au cours d'une opération indique que la ventilation n'est pas adéquate. Cessez votre travail afin de prendre les mesures nécessaires pour améliorer la ventilation dans l'aire de travail. Ne poursuivez pas l'opération si le malaise persiste.
4. Consultez ANSI/ASC Standard Z49.1 (à la page suivante) pour des recommandations spécifiques concernant la ventilation.
5. **AVERTISSEMENT :** Ce produitcontient des produits chimiques, notamment du plomb, reconnu par l'Étatde la Californie pour causerdes malformations congénitaleset d'autresdommages touchant le système reproductif. ***Se laver les mainsaprès manipulation.***

MANIPULATION DES CYLINDRES -- La manipulation d'un cylindre, sans observer les précautions nécessaires, peut produire des fissures et un échappement dangereux des gaz. Une brisure soudaine du cylindre, de la soupape ou du dispositif de surpression peut causer des blessures graves ou mortelles. Par conséquent :

1. Utilisez toujours le gaz prévu pour une opération et le détendeur approprié conçu pour utilisation sur les cylindres de gaz comprimé. N'utilisez jamais d'adaptateur. Maintenez en bon état les tuyaux et les raccords. Observez les instructions d'opération du fabricant pour assembler le détendeur sur un cylindre de gaz comprimé.
2. Fixez les cylindres dans une position verticale, à l'aide d'une chaîne ou une sangle, sur un chariot manuel, un châssis de roulement, un banc, un mur, une colonne ou un support convenable. Ne fixez jamais un cylindre à un poste de travail ou toute autre dispositif faisant partie d'un circuit électrique.
3. Lorsque les cylindres ne servent pas, gardez les soupapes fermées. Si le détendeur n'est pas branché, assurez-vous que le bouchon de protection de la soupape est bien en place. Fixez et déplacez les cylindres à l'aide d'un chariot manuel approprié. Toujours manipuler les cylindres avec soin.
4. Placez les cylindres à une distance appropriée de toute source de chaleur, des étincelles et des flammes. Ne jamais amorcer l'arc sur un cylindre.
5. Pour de l'information supplémentaire, consultez CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", mis à votre disposition par le Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

ENTRETIEN DE L'ÉQUIPEMENT -- Un équipement entretenu de façon défectueuse ou inadéquate peut causer des blessures graves ou mortelles. Par conséquent :

1. Efforcez-vous de toujours confier les tâches d'installation, de dépannage et d'entretien à un personnel qualifié. N'effectuez aucune réparation électrique à moins d'être qualifié à cet effet.
2. Avant de procéder à une tâche d'entretien à l'intérieur de la source d'alimentation, débranchez l'alimentation électrique.
3. Maintenez les câbles, les fils de mise à la terre, les branchements, le cordon d'alimentation et la source d'alimentation en bon état. N'utilisez jamais un équipement s'il présente une défectuosité quelconque.

4. N'utilisez pas l'équipement de façon abusive. Gardez l'équipement à l'écart de toute source de chaleur, notamment des fours, de l'humidité, des flaques d'eau, de l'huile ou de la graisse, des atmosphères corrosives et des intempéries.
5. Laissez en place tous les dispositifs de sécurité et tous les panneaux de la console et maintenez-les en bon état.
6. Utilisez l'équipement conformément à son usage prévu et n'effectuez aucune modification.

INFORMATIONS SUPPLÉMENTAIRES RELATI VES À LA SÉCURITÉ -- Pour obtenir de l'information supplémentaire sur les règles de sécurité à observer pour l'équipement de soudage à l'arc électrique et le coupage, demandez un exemplaire du livret "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

Les publications suivantes sont également recommandées et mises à votre disposition par l'American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126 :

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting".
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding".
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting".
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting".
5. AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding".
6. AWS C5.6 - "Recommended Practices for Gas Metal Arc Welding".
7. AWS SP - "Safe Practices" - Reprint, Welding Handbook.
8. ANSI/AWS F4.1, "Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances."
9. CSA Standard - W117.2 = Safety in Welding, Cutting and Allied Processes.

SIGNIFICATION DES SYMBOLES - Ce symbole, utilisé partout dans ce manuel, signifie "Attention" ! Soyez vigilant ! Votre sécurité est en jeu.

DANGER — **Signifie un danger immédiat. La situation peut entraîner des blessures graves ou mortelles.**

MISE EN GARDE — **Signifie un danger potentiel qui peut entraîner des blessures graves ou mortelles.**

AVERTISSEMENT — **Signifie un danger qui peut entraîner des blessures corporelles mineures.**

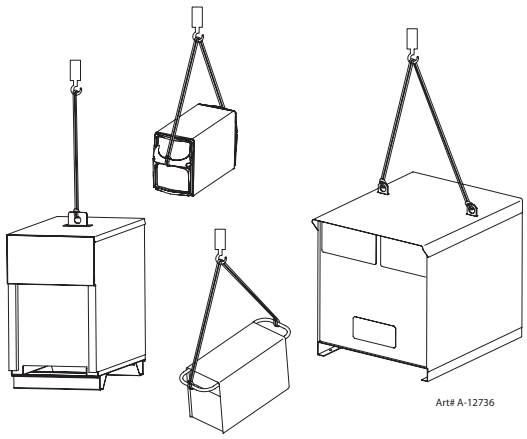
Classe de protection de l'enveloppe

L'indice de protection (codification IP) indique la classe de protection de l'enveloppe, c'est-à-dire, le degré de protection contre les corps solides étrangers ou l'eau. L'enveloppe protège contre le toucher, la pénétration d'objets solides dont le diamètre dépasse 12 mm et contre l'eau pulvérisée à un angle de jusqu'à 60 degrés de la verticale. Les équipements portant la marque IP21S peuvent être entreposés à l'extérieur, mais ne sont pas conçus pour être utilisés à l'extérieur pendant une précipitation à moins d'être à l'abri.

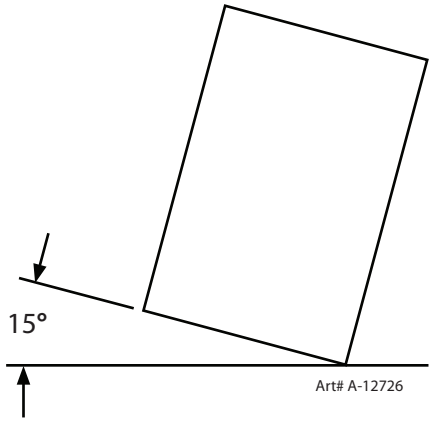
MISE EN GARDE — **Ce produit a été conçu pour la découpe au plasma seulement. Toute autre utilisation pourrait causer des blessures et/ou endommager l'appareil.**

MISE EN GARDE

L'équipement pourrait basculer s'il est placé sur une surface dont la pente dépasse 15°. Vous pourriez vous blesser ou endommager l'équipement de façon importante.



Art# A-12736



Art# A-12726

MISE EN GARDE

Soulevez à l'aide de la méthode et des points d'attache illustrés afin d'éviter de vous blesser ou d'endommager l'équipement.

SECTION 2: SPECIFICATIONS

2.1 System Description

iCNC Performance is intended for shape cutting control. iCNC Performance has motion control, I/O, user interface and an optional plasma height control built all in one package. These units are not field repairable. Unauthorized opening of the unit will void the warranty.

2.2 Specification

Processor	2, Intel (secondary processor for motion & I/O)
Operating system	Windows 7 Embedded
Ram	2GB
Ethernet ports	1 RJ-45 and 1 WLAN
USB ports	2, 1 On back wall (USB2.0) + 1 On door (USB2.0)
Serial ports	1 RS-422/485 port on d-sub 9 pin
Hard drive	120GB SATA SSD
Operating console	Total of 35 buttons and a digital potentiometer
Display	15” With touch panel (resistive)
Number of I/O	20 outputs and 16 inputs
I/O type	Outputs and inputs are grounding
Axes available	1-2 Y, 1 X, optional 1Z (iHC)
Default drives interface	Analog +-10V speed signal, step/direction, incremental encoder inputs
Integrated plasma height control	Optional iHC height control
CNC input power volts (amps)	24VDC (5A), with optional iHC 24VDC 6A.
CNC protection device	Automatic fuse

CAUTION
See full technical details from the service manual 0-5401

WARNING
Do not operate or service the device without proper training.

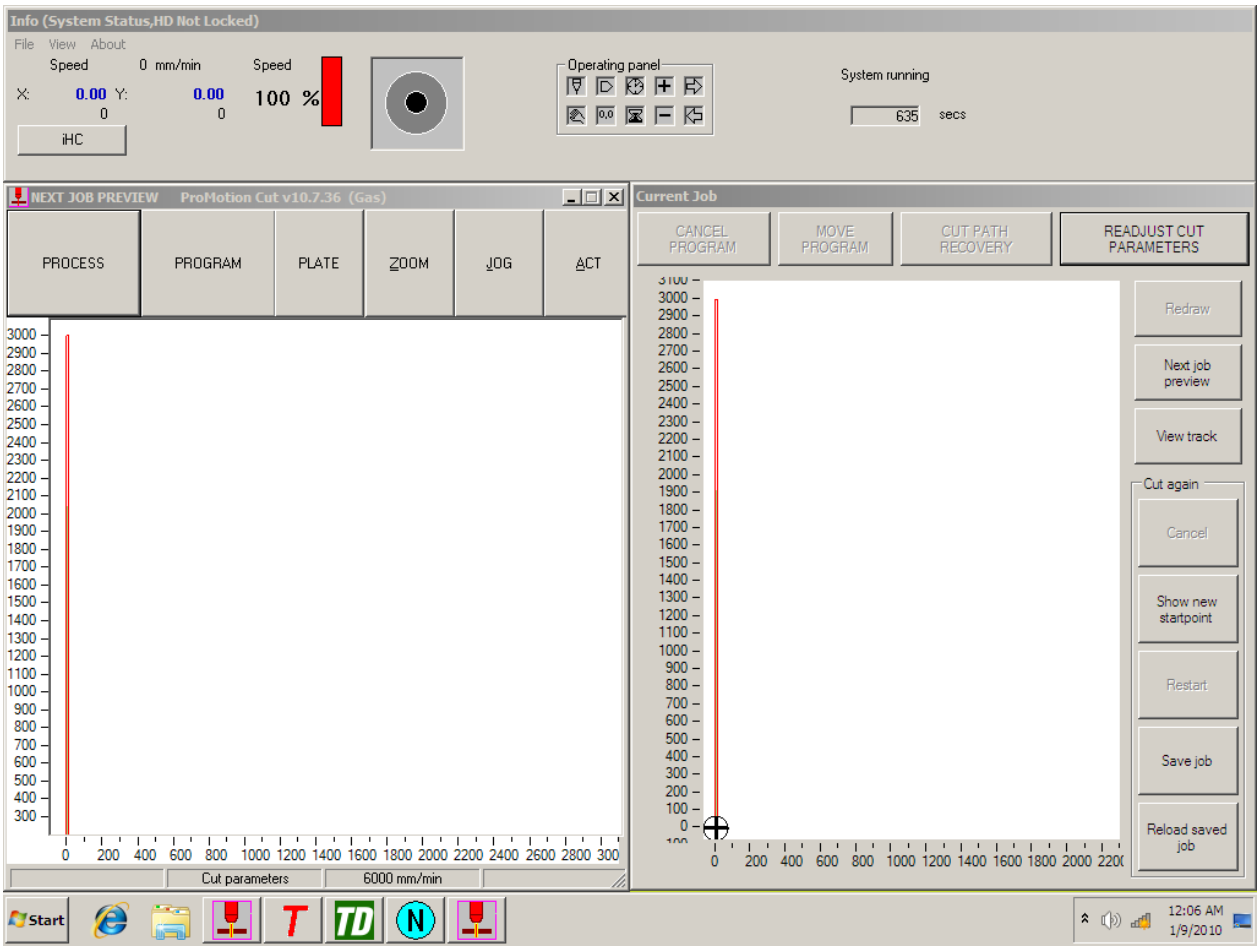
This Page Intentionally Blank

SECTION 3: OPERATION

3.1 Overview Main Screen

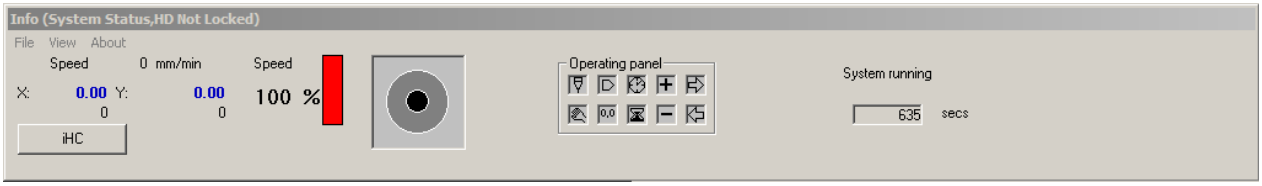
The main screen is divided into three parts.

- Info (Systems Status)
- Promotion Cut – Next Job Preview
- Current Job



3.1.1 Info (System Status)

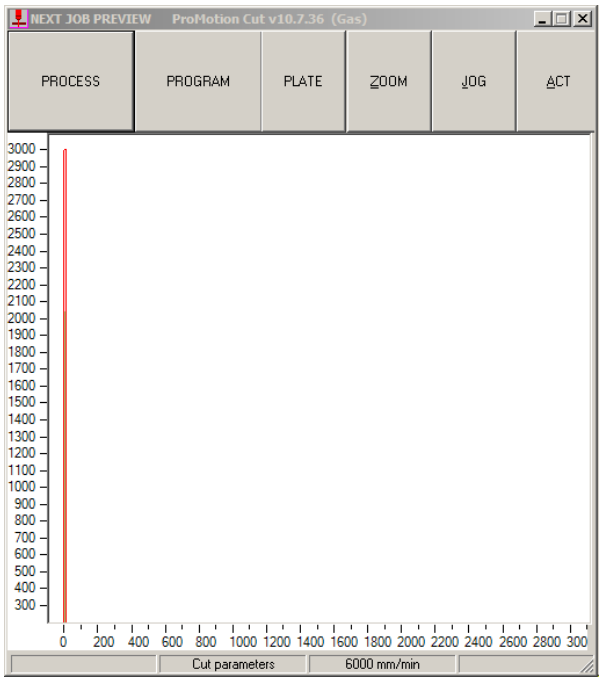
This is located on top of the screen. The info screen shows system information and is used for diagnostics and troubleshooting.



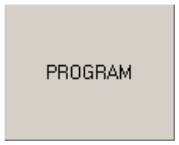
- Speed IPM (or metric) indicates machine speed.
- X & Y readouts indicate absolute position of the cutting tool.
- Speed Bar in %. This is interfaced directly with the Speed Potentiometer and will reflect the speed pot setting.
- Jogging direction indicator. Monitors and shows which direction/jogging key is pressed.
- Operational Panel – Interfaced with the 9 push buttons. Monitors which button is pressed or activated.
- System Running – Indicates that the second CPU is activated and functionally properly.

3.1.2 ProMotion Cut – Next Job

Located on the left hand side of the screen, the ProMotion Cut Screen is the starting point to navigate throughout the different screens.



Opens the process selection window.



Selecting the Program button will open the selection to Macro Shape Library or download in ProMotion Nest.

Plate button open the plate alignment window.

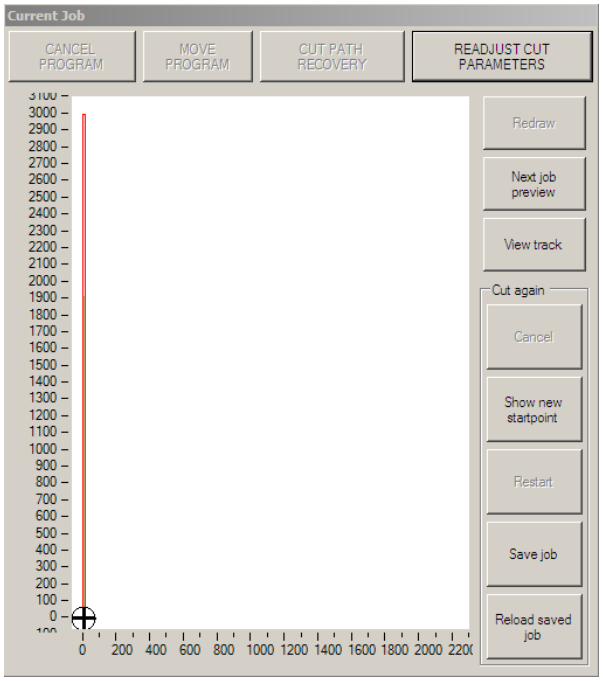
Zoom button opens the zoom window. This lets you take a closer look at the parts.

Opens to the jog screen dialog box. Functions like Drive machine to and Rip cut are located under this jog dialog box.

Selecting on the Act button will allow you to do a trial run of the program, select on board manual, and the options to open the menu bar on Promotion Cut - Next Job Screen.

3.1.3 Current Job

Located on the right hand side of the screen, the Current Job window displays the current job being cut with real time tracking.



CANCEL PROGRAM

Stop– Normally grayed out. Activated when a cutting program is stopped by pressing the Torch On/Off or the Backup button located on the front panel of the controller. Selecting Cancel Program will terminate the current job being cut or trial run.

MOVE PROGRAM

Normally grayed out, it becomes activated when a cutting program is stopped and the Manual Mode button is selected. When confirming if a part program fits on a plate, i.e. in Trial Run mode, it will re-position the program the same distance as the torch movement.

CUT PATH RECOVERY

Normally grayed out. Activated when a current program is stopped and the Manual Mode button is selected. Selecting Cut Path Recovery will re-start the pierce cycle at the point the torch is located and will allow travel back to the original program path.

READJUST CUT PARAMETERS

Selecting the Readjust Cut Parameters button will allow the operator to change certain parameters i.e. cutting speeds, creep speed/time, and delays, to the cutting program on the fly. This will eliminate the need for stopping the machine to make these changes.

Redraw

Refresh the current job screen.

Next job preview

Selecting the Next job preview will transfer the next program from the Next Job Preview screen without activating the cutting sequence. This is grayed out during cutting.

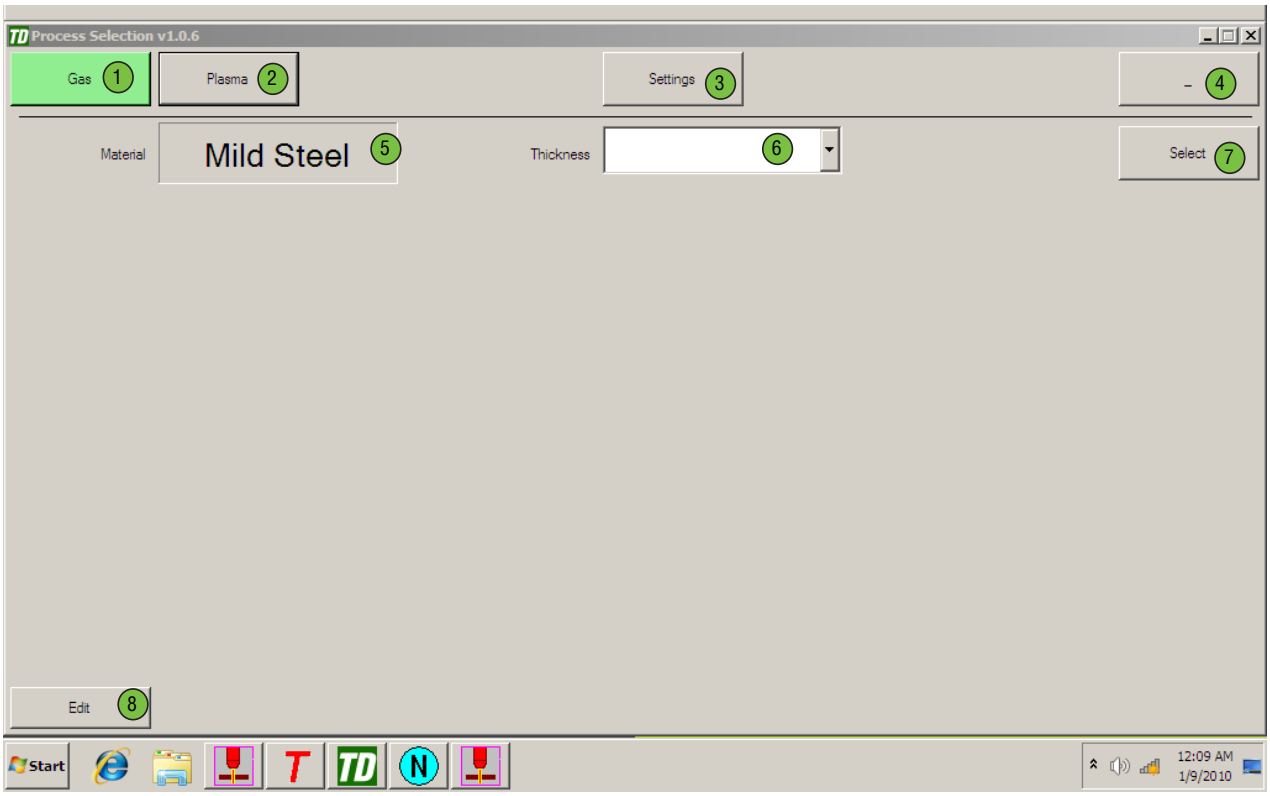
View track

Selecting the view track during cutting will zoom in on the cutting path.

The Cut again box allows the opportunity to suspend and save a current job and restart a saved job.

- Cancel – Cancel any selected functions under the Cut again box
- Show new start point – Selecting this function allows the user to point the pierce point that will start the cut. Parts before the selection will be ignored.
- Restart - After locating a new pierce point, select Restart to start cutting cycle
- Zoom – Allows easier pierce point location on a nest by zooming-in on a part
- Save job – Will store existing suspended program to a temporary file
- Reload saved job – Brings back the suspended saved program from the temporary file

3.2 Process Selection / Plasma and Gas



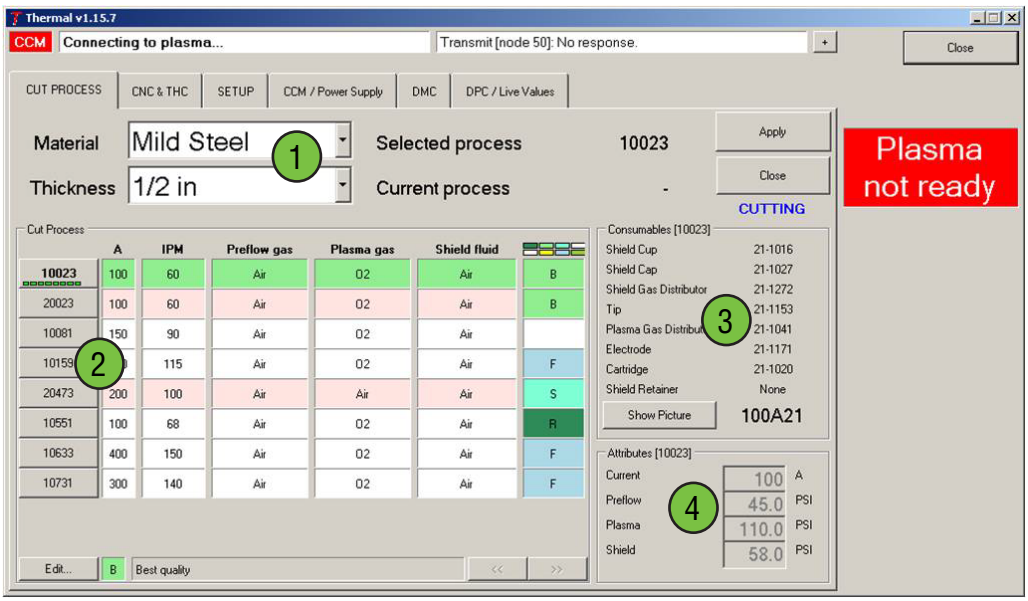
In this window you can select the process used to cut or edit existing processes.

1. Clicking Gas will open the gas parameter set selection.
2. Clicking Plasma will open the plasma process window.
3. Settings opens common setting like tool offsets, rapid speed etc.
4. Minimizes the window.
5. Shows the material. If there are more than one material you can change between materials.
6. Select thickness
7. Applies the selected process and sets all cutting parameters.
8. Lets you edit the selected process..

NOTE!
See more details from “3.14 Advanced Process Selection Features” on page 3-20“

3.2.1 Plasma Setup

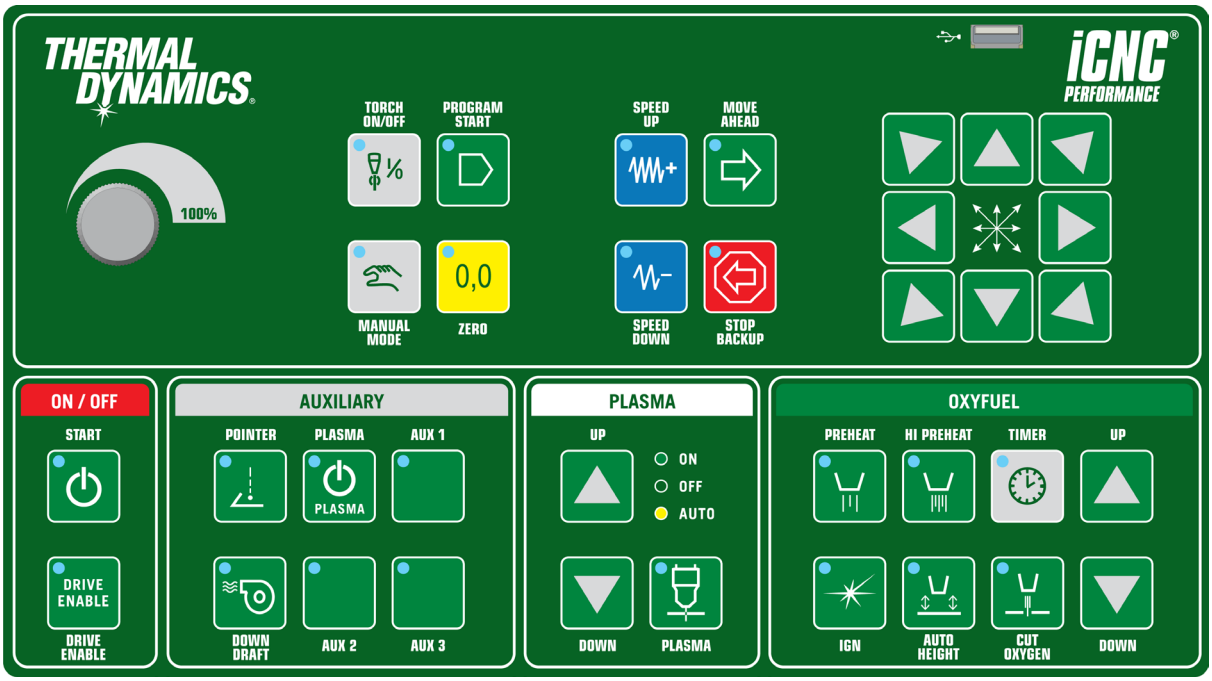
Definition of areas under the Cut Process Tab are shown on the bottom of the Thermal Screen



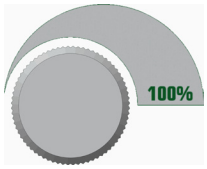
1. Use the drop down boxes to select the material and thickness to be cut.
2. The available cut processes for the selected material and thickness will be displayed along with information indicating which process is “B” for Best cut quality. “F” for Fastest cut speed. “R” using the robotic consumables for beveling. “M” indicating maximum piercing thickness. Select the desired process by clicking on the Cut Process number and clicking the “Apply” button. When “Current process” equals “Selected process” the plasma is ready to cut. If red “Plasma not ready” is on check that the plasma is enabled via a switch located on the CNC panel.
3. This area shows the consumable to be used for the selected process. Click on “Show Picture” to see a picture of the consumables.
4. This area shows the cutting current and gas pressures that will be used for the selected cutting process.

3.3 Front Panel Buttons

The iCNC Performance operating control panel is located below the LCD graphics screen. Most machine motion and cutting functions are initiated using this operating control panel.

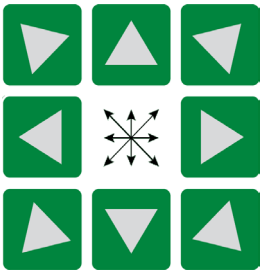


3.3.1 Speed Potentiometer



Turning the potentiometer counter clockwise decreases the actual speed in comparison with the programmed speed. This potentiometer is only used in special cases, such as temporarily slowing down the cutting speed. Turning the dial down below 100 % causes the Torch Hold / Corner signal to be activated, which freezes the automatic torch height control at that height. In most cases the speed potentiometer is set at 100% clockwise.

3.3.2 Direction Jog Keys



MANUAL MODE must be activated before using the jog function. Press and hold a directional button and the machine will move in that direction. Releasing the button will cause the machine to stop. Pressing and holding two adjoining directional buttons will move both axis simultaneously in a 45 degree direction.

3.3.3 Manual Mode Button

Pressing the MANUAL MODE button activates the capability to jog and reposition the machine.

CAUTION
Pressing the MANUAL MODE button again will turn off the manual mode and will ask if you want to return the machine to the last known parked position.

3.3.4 Zero Button

Resets the X & Y counters to ZERO after locating a new starting point on the table using the jog function keys.

HINT: Pressing the zero button will automatically turn off the manual mode button, if it was activated on.

3.3.5 Start Button

Sends the cutting program from the “next job preview” screen to the “current job” screen to be executed, and starts the cutting cycle sequence. The START- button illuminates and is on during the entire execution of the program. No programs can be transferred to the current job screen if the START button is on.

HINT: If this button is pressed during a programmed delay, the delay is terminated at once without memorizing the interrupted time of the delay in cutting parameters.

3.3.6 Torch ON/OFF Button

Pressing the TORCH ON / OFF button when manual mode is activated, will either manually start or turn off the cutting process.

CAUTION
When the start button is activated, and the cutting sequence is initiated, the TORCH ON/OFF button will automatically illuminate indicating the torch is on and the cutting sequence has started. When the program ends, the light will go out automatically indicating end of cut. If TORCH ON/OFF is pressed and released during the cutting process, machine motion and cutting stops. Pressing this button again starts machine motion and the cutting sequence with any programmed delays

.

HINT: You can’t use TORCH ON/OFF for manual cutting, eg. scrap lines. Manual button on push the TORCH ON and the pierce sequence will begin. Immediately after pushing TORCH you can start pushing a directional button, the machine won’t start to move before the pierce sequence has ended.

3.3.8 Speed Up & Speed Down Buttons

Short pushes increase or decrease the actual and set speed in small steps. Long lasting pushes change the speeds at a faster rate. The pushbuttons will illuminate during automatic corner acceleration and deceleration respectively.

3.3.9 Move Ahead Button

The MOVE AHEAD button is illuminated whenever a program is running. Pressing the Torch On/Off button will stop the machine and the Move Ahead button will turn off. At this point, pressing the MOVE AHEAD button will cause the machine to move forward on programmed path without cutting. Pressing the MOVE AHEAD button again will stop machine motion.

HINT: Turn speed potentiometer counter clockwise when using the Move Ahead feature for more precise control.

3.3.10 Stop / Backup Button

Press and release the STOP BACKUP button once during the cutting process to stop the cutting sequence and halt machine motion. Press and release the STOP BACKUP button again to move the machine in reverse, or backup on path. Pressing STOP BACKUP button again will stop motion.

HINT: Both the Stop-Backup and Torch on/off buttons work identically when running a cutting program. Pressing either button will allow cutting to stop.

3.4 ON/OFF Button Descriptions and Functions

CAUTION
Most buttons have 2 functions, different color LEDs indicate the state. Pressing a button will toggle the function ON/OFF and keeping the button pressed in for 3 seconds will toggle the function to AUTO. Green LED indicates ON state and orange indicates AUTO state. If both LEDs are OFF then the state is OFF.

ON / OFF

3.4.1 Input Power Switch

Push the button and keep it pressed in for five seconds and it will turn on power to the CNC.

The only way to switch power OFF is using Windows shutdown. This will switch off all power in the controller.

3.4.2 Drive Switch

- ON will turn servo enable ON and allow machine motion.
- OFF will prevent machine motion.

HINT: When drive enable LED is Green the drives are enabled. When the LED is orange, button has been pressed but the software restricts the output to activate.

3.5 Auxiliary Button Descriptions and Functions

CAUTION
Most buttons have 2 functions and the different color LEDs indicate the state. Pressing a button will toggle the function ON/OFF and keeping the button pressed in for 3 seconds will toggle the function to AUTO. Green LED indicates ON state and orange indicates AUTO state. If both LEDs are OFF then the state is OFF.

AUXILIARY

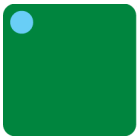
3.5.1 Pointer

- ON position will activate the Pointer output.
- OFF position will prevent activating the Pointer output.

3.5.2 Plasma ON/OFF

- ON position will turn on the plasma power supply.
- OFF position will turn off the plasma power supply.

3.5.3 AUX 1-3 On/Off/Auto



- ON position will activate the auxiliary device, example water table.
- AUTO position will activate the auxiliary device, example water table when a cutting program is active.
- OFF position will turn off the auxiliary device, example water table).

3.5.4 Down Draft On/Off/Auto

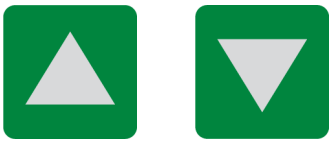
- ON position will activate the fume extractor.
- AUTO position will activate the fume extractor when a cutting program is active.
- OFF position will turn off the fume extractor.

3.6 Plasma Button Descriptions and Functions

CAUTION
Most buttons have 2 functions and the different color LEDs indicate the state. Pressing a button will toggle the function ON/OFF and keeping the button pressed in for 3 seconds will toggle the function to AUTO. Green LED indicates ON state and orange indicates AUTO state. If both LEDs are OFF then the state is OFF

PLASMA

3.6.1 Up / Down



- Up / Down button will move the plasma torch Up/Down.

3.6.2 Plasma On/Off/Auto

- ON position will activate the plasma start output.
- AUTO position will activate the plasma start output when a cutting program is active.
- OFF position will turn off the plasma start output.

3.7 Oxyfuel Button Descriptions and Functions

CAUTION
Most buttons have 2 functions and the different color LEDs indicate the state. Pressing a button will toggle the function ON/OFF and keeping the button pressed in for 3 seconds will toggle the function to AUTO. Green LED indicates ON state and orange indicates AUTO state. If both LEDs are OFF then the state is OFF.

OXYFUEL

3.7.1 Preheat On/Off/Auto

This switch handles the Oxy Fuel Low Preheat gases.

- ON position will open the low preheat solenoid valve.
- Switch the gases OFF by pressing the button once.
- AUTO position will allow the cutting program to open the High Preheat solenoid when necessary.
- OFF position will prevent a cutting program from opening the Preheat solenoid valve

3.7.2 High Preheat On/Off/Auto

This switch handles the Oxy Fuel High Preheat gases.

- ON position will open the Hi Preheat solenoid valve.
- Switch the gases OFF by pressing the button once.
- AUTO position will allow the cutting program to open the High Preheat solenoid when necessary.
- OFF position will prevent a cutting program from opening the High Preheat solenoid valve.

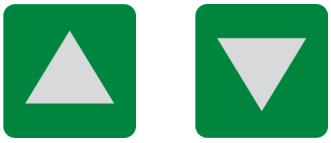
3.7.3 Record Time

RECORD TIME

During any start or end delay of the cutting process you will see this button light up. At the same time a counter on the screen counts down remaining seconds for current delay.

If this button is pressed during a programmed delay, the delay is terminated at once. The system memorizes the interrupted time of the delay and uses this new delay time in next pierces.

3.7.4 Up/Down



- Up / Down button will move the oxyfuel torch Up/Down.

3.7.5 Ignition On/Off/Auto

- ON position will activate the igniter.
- AUTO position will allow the cutting program to activate the igniter when necessary.
- OFF position will prevent the cutting program from activating the igniter.

3.7.6 Auto Height On/Off/Auto

- ON position will activate the capacitive height sensing.
- AUTO position will allow the cutting program to activate the capacitive height sensing when necessary.
- OFF position will prevent the cutting program from activating the capacitive height sensing.

3.7.7 Cutting Oxygen On/Off/Auto

- ON position will open the cutting oxygen solenoid
- AUTO position will allow the cutting program to open the cutting oxygen solenoid when necessary
- OFF position will prevent the cutting program from opening the cutting oxygen solenoid valve.

3.8 Starting Procedure

Switch on the system by pressing the power button located on the far left hand side of the unit for 5 seconds. When power is applied, the iCNC Performance will take approximately 1-2 minutes to go through internal diagnostics and fully boot up. After full power up, the Promotion Work Screen displaying Promotion Cut, Next Job Preview and Current Job along with Info (System Status) will be displayed. In addition, you will see the yellow Zero button flashing. This will stop automatically.

HINT: The flashing Zero button indicates that the second CPU (used for machine motion) has booted up correctly. The Zero button flashes 41 times.

Turn ON the drive enable the drive enable to enable the drives. A dialog box may appear START HOMING PROCEDURE.

3.8.1. Shutting Off / Removing Power

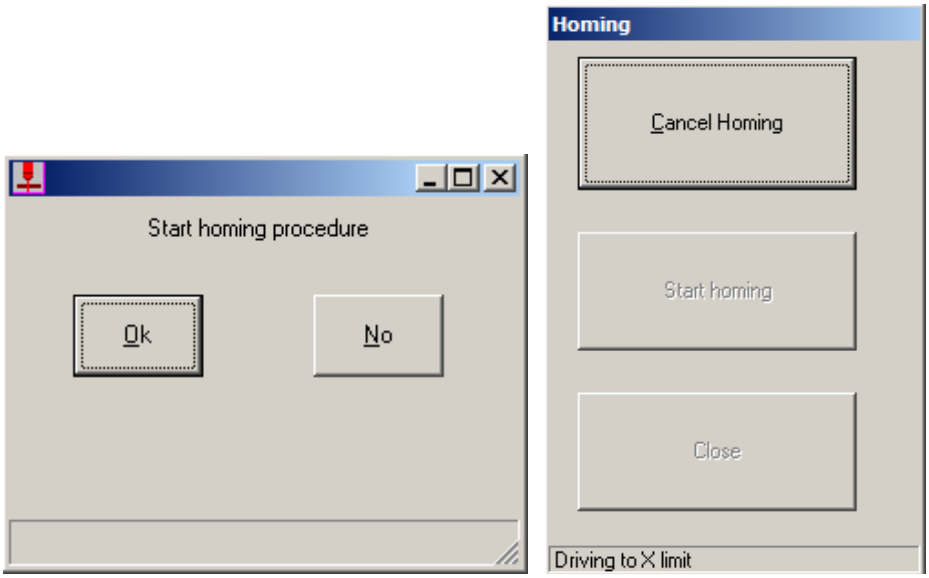
After locating a safe parked position, disable the drives by turning the drive enable to OFF. Turn off the controller using the normal Windows shutdown method. Click on Start (bottom left hand corner) on Window's task bar, then click Shut down.

After the controller goes through a proper cycle down procedure the controller will turn off.

HINT: If applicable, parking the machine near the homing switches will make Machine Homing quick and easy when the iCNC Performance is powered up again.

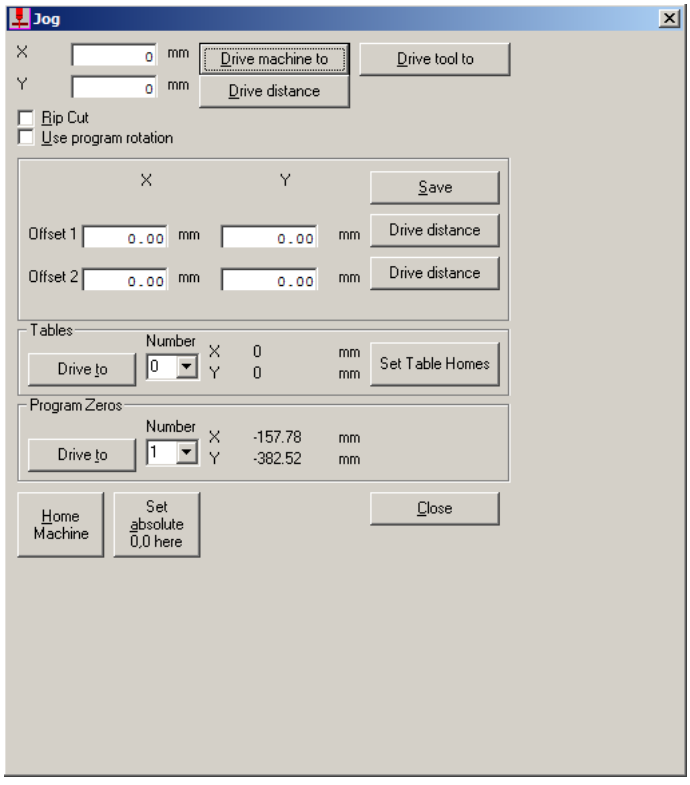
3.9 Homing Procedure

During initial power up, the iCNC Performance may display a Start homing procedure dialog box. If you select Yes, the machine will automatically locate the absolute zero home location. As a default, this is normally set at the bottom left corner of the cutting table, however this is selectable in the set-up parameters. If you select No, the dialog box disappears and no movement is executed.



3.10 Jog

When selecting the Jog Button, the Jog dialog box will appear.



You can use the Jog tool only when a cutting program is not running and the controller is not in Manual Mode. Use this tool to drive the machine to a position (X,Y) or to drive a distance (X,Y) from the current position. Driving is usually done in rapid speed. It is also possible to cut with this tool, if you have checked the Rip Cut box.

If “Use program rotation” is checked, the coordinates where you drive are corrected according to the program rotation. The program rotation is set in the parameter quick view screen.

Offsets

If there is a need to drive the same distance often (i.e. plasma torch to the same position where gas torch was) it's useful to save these kinds of distances as default offsets (offset 1 and 2). This way you can drive the default offset by just clicking one button.

Tables

It is possible to define several different home positions. These can be used to define the home positions of different plates on the cutting table, or different cutting tables. Select the Table Number from the list and click the Drive to button. The machine drives to the defined home position of the selected table.

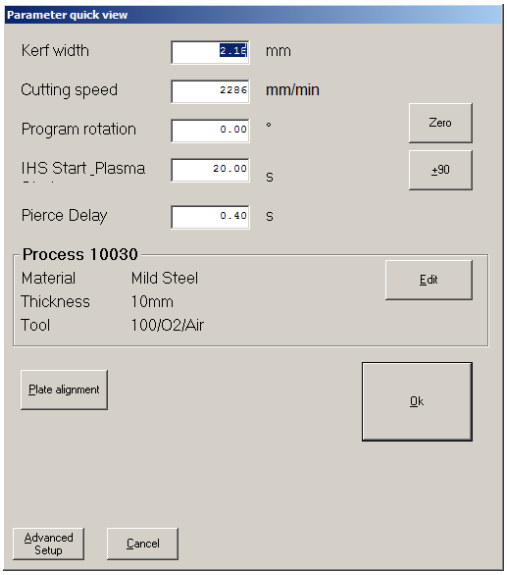
Program Zeros

iCNC Performance will save the coordinates for last 5 program starts relative to the absolute 0.0 position. You can choose the wanted program zero point from the drop down list and click drive to.

Set absolute zero (home) position by clicking the Set absolute 0,0 here button. This tool is needed, if the programmed working area limits are in use. Those limits force the machine to stop before it hits the electrical limit switches. Setting absolute zero position can also be automatic, when the machine is driven to the pre-defined zero position every time the controller is turned on. Absolute zero position is also needed, if there is a need to set several home positions.

3.11 Parameter Quick View

The parameter quick view screen opens automatically when a program is sent to cutting from Promotion Nest or when the Setup button is clicked. The quick view screen allows the operator to change the most commonly used variable parameters quickly. It also provides options for plate alignment and advanced set up.



Kerf Width

Specifies the amount of kerf (compensation) that will be applied to the cutting program. Caution should be taken when selecting the amount of kerf. To high a value can cause the program to be altered, especially when a radius of an arc is smaller than the kerf value.

Cutting Speed

This is the speed of the cutting process.

Program Rotation

Any value (degree) will rotate the cutting program. When a plate alignment is performed the rotation of the skewed plate is automatically entered here. Also, by clicking on the +/- 90 the part program will rotate at 90 degree intervals. Clicking on the zero box will clear any value of rotation to zero degrees.

IHS/Plasma Start

Time for the torch to go ignition height and ignite the plasma arc. Any excess time will be discarded and next delay will be performed (Pierce Delay).

Pierce Delay

This is a move delay after the pierce has started.

Parameter Set (Plasma)

If selected in the Advanced Setup screen, the material type, thickness and tool used will appear here to guide the operator on the current parameter selection.

NOTE!
Additional delays or adjustable time dialog boxes may appear, depending on how the controller has been set-up by an OEM or installer.

3.11.2 Plate Alignment

Activating Plate Alignment allows for a quick and easy way to pick two points on the edge of a skewed plate. Performing this exercise will automatically rotate a part or program nest the same amount as the plate skew so that it will fit precisely onto the plate, reducing scrap or manual plate squaring.

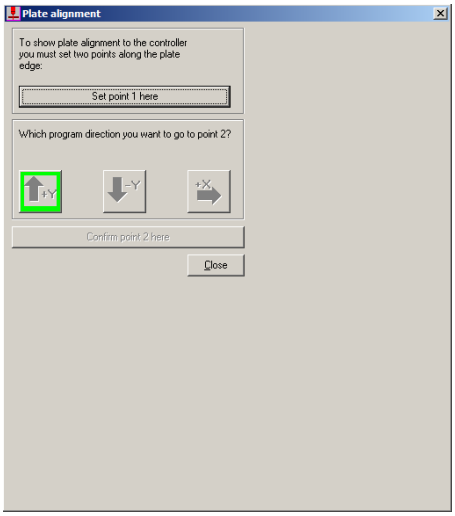


Plate alignment
To show plate alignment to the controller you must set two points along the plate edge:
Set point 1 here
Which program direction you want to go to point 2?
+Y
-Y
+X
Confirm point 2 here
Close

To use the Plate Alignment feature, locate a corner or plate edge and click Set point 1 here. Select which direction the next point is relative to the first location, travel to the second point and click on Confirm point 2 here. This will automatically rotate the program to match the skewed plate

3.12 How To Proceed When Something Happens

3.12.1 How to Cancel a Cutting Program

1. Stop the machine movement and cutting by pressing TORCH ON/OFF or STOP BACKUP button.
2. Use the left mouse button to click the CANCEL PROGRAM button located at the top of the current job screen.
3. Wait until a new dialog box opens telling that the machine must return to 0,0-point. Click OK and machine runs back to 0,0-point (original starting point of the cancelled program).

If you want to terminate the program during the rapid movement, the procedure is mainly the same. The only difference is that you stop the machine using STOP BACKUP button instead of the TORCH ON/OFF.

3.12.2 Difficulties While Piercing

NOTE!
If the piercing fails in Plasma Mode, the machine will stop.

1. Adjust the speed slower with the SPEED knob if necessary.
2. Drive slowly backwards by pressing and holding STOP BACKUP and the machine will reverse on program path.
3. Stop the movement after passing the missed piercing point by releasing STOP BACKUP again.
4. Turn the speed back to 100%.
3. Start the program again by pressing MOVE AHEAD.

If the piercing fails at the first programmed piercing point, start a new piercing sequence by pressing TORCH ON/OFF.

Please notice that the movement backwards without cutting may be adjusted so that the speed is automatically reduced.

3.12.3 If the Cutting Fails

If the cutting is terminated e.g. for too high speed:

1. Stop the movement and cutting by pressing TORCH ON/OFF or STOP BACKUP.
2. Adjust the speed slower with the SPEED knob if necessary.
3. Drive slowly backwards by pressing and holding STOP BACKUP and the machine will reverse.
4. Stop the movement by releasing STOP BACKUP.
3. Turn the SPEED back to 100%.
6. Click on READJUST CUT PARAMETERS button on the Current Job screen.
7. Readjust cutting speed to a lower value by clicking inside the box and use the mouse wheel to enter new value and click OK.
8. Start the cutting delays and the cutting with TORCH ON/OFF. After the start delays, machine movement starts automatically.
9. Adjust the starting speed with the SPEED knob if required.
10. While cutting, the cutting speed can be easily readjusted by pressing the blue SPEED UP/DOWN buttons. Every short press increases or decreases the speed about 1/2 ipm (10 mm/min).

3.12.4 Manual Cutting

1. Press and release the MANUAL MODE button.
2. Drive the machine to the wanted piercing point by using the jog buttons.
3. Press and release TORCH ON/OFF button to start the cutting cycle.
4. Press the JOG buttons of the desired direction to start the movement.
3. Press TORCH ON/OFF to stop the cutting and release JOG button to stop the movement.
6. Press and release ZERO button if you want to stay in that place. MANUAL MODE ends automatically. If you want to return to that point where you started the MANUAL MODE, just press and release the MANUAL MODE button. The button starts to flash and machine runs back to that point.

3.12.5 Programmed Manual Cutting

NOTE!
The MANUAL MODE button must be OFF when using this procedure.

On the Cut Screen, there is a JOG button for programmed manual cutting.

1. Drive the torch to the desired piercing point and press and release the ZERO button.
2. Open the dialog box by clicking JOG button. Use the mouse wheel to enter the exact distance X and Y you want the machine to move.
3. Check the Rip Cut box.
4. Click on Drive Machine. The machine starts the cutting cycle and drives the programmed path. At the end of that path the torch is turned off and the machine stops, both automatically.

3.12.6 Trial Run, No Cutting

This will allow faster set up to reposition a program on the plate, eliminating the need to reposition the plate.

1. Call up the wanted program on the Next JOB screen.
2. Bring the cutting program to CURRENT JOB window by clicking the Next Job Preview button
3. Press and release the MANUAL MODE button.
4. Drive the torch to the wanted starting point of the program by using the jog buttons. Press the ZERO button.
3. Click the ACT button on the cut screen and click on the Trial Run box.
6. Enter a trial mode speed and click GO.
7. The machine will perform the programmed path without commanding the plasma on.
8. If the torch runs off the plate, press and release the TORCH ON/OFF button.
9. Turn on the MANUAL MODE by pressing and releasing the MANUAL MODE button. Set a slow speed with the SPEED knob and use the jog key buttons to reposition the torch back on the plate.
10. Click the MOVE PROGRAM text on the Current Job Screen.
11. Turn off the MANUAL MODE by pressing and releasing the MANUAL MODE button.
12. Press the TORCH ON/OFF button again.
13. Repeat steps 8-12 if the torch runs off the plate again.
14. When the trial run is over, return to ZERO.

3.12.7 Other Way to Check the Cutting Area

You can check if the next cutting program fits on the plate this way as well.

1. Bring the cutting program to CURRENT JOB window by clicking the Next Job Preview button in it.
2. Set the torch on 0,0 point and press ZERO.
3. Move the mouse on this window and click the left mouse button. A window appears which shows the torch position with big numbers and the mouse cursor starts to follow the torch position.
4. Drive the torch on the critical corner of the program and check if there still is plate under the torch.
3. Use zoom to check the situation exactly. Zoom window follows the torch automatically.
6. If the program location is OK, press the MANUAL MODE button and then select return to the 0,0point.
7. Free the mouse by pressing the left mouse button on the right screen area again. This also closes the Tool Position window.

3.12.8 Cut Path Recovery

This tool is used to return to cut path in the event the program was stopped and the torch was moved from the path.

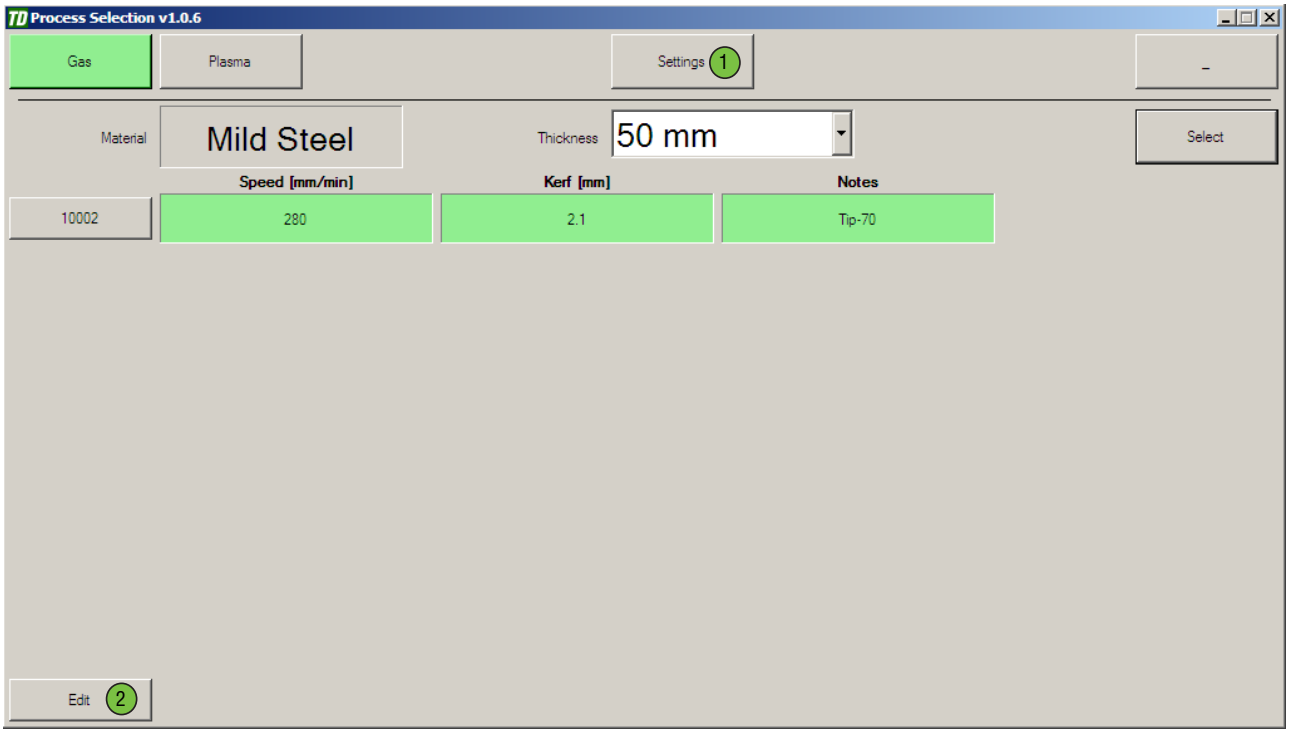
1. Press and release the TORCH ON/OFF button to stop motion and cutting.
2. Turn on the MANUAL MODE by pressing and releasing the MANUAL MODE button and use the Jog key buttons to drive the torch to a convenient place to perform work on the torch.
3. Disable the plasma power supply by pressing the Plasma ON/OFF button and service the torch if needed. After finished enable the plasma power supply by pressing the button again.
4. Turn off the MANUAL MODE by pressing and releasing the MANUAL MODE button - the button starts to flash and the torch travels back to exit point of the program path.
3. Press and release the TORCH ON/OFF button to ON and cutting will start again and continue cutting on programmed path.

3.12.9 How to pierce in the Scrap Area Prior to Finding the Cut Path.

1. After Step 4 turn on the MANUAL MODE again by pressing and releasing the MANUAL MODE button.
2. Use the Jog key buttons and reposition the torch close to the end of the cut. Stay on the scrap side. Click on Cut Path Recovery button located on the Current Job Screen and machine will automatically start the piercing at this point and pick up the cut path to continue cutting on the programmed path.

3.14 Advanced Process Selection Features

The process selection screen allows the operator the flexibility to change more parameters if needed. Process selection has tabs containing different settings. You can get to the different settings by clicking either Settings (1) or Edit (2) when a process is selected. You can also build a material database of common materials being cut, and save different speeds and kerf values within each profile and for each process you edit.



Settings is described first.

Settings

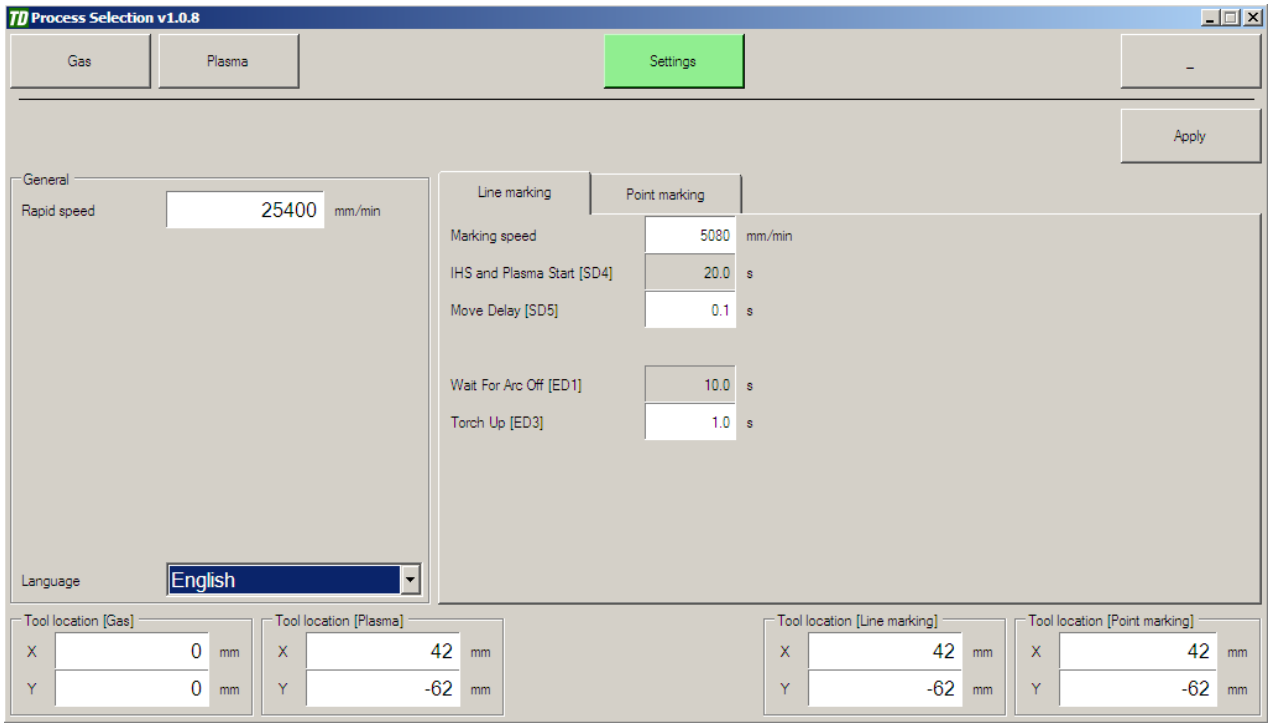
Allows changes to tool offsets, rapid speed, point marking and line marking.

Edit

Allows to change parameters for the selected process (delay times, kerf, speed etc.).

3.14.1 Settings

On the Settings tab you can change the general parameters like Rapid Speed, Language, Tool locations and Marking settings.



NOTE!
Parameter windows may alternate based on the machine setup. See installation/service manual about setting delays and names.
Pictures for reference only.

Language

Select the language used in process selection.

Tool Locations

If a laser pointer is installed on the machine, it is best to define tool locations relative to the laser pointer. This way you can position and set the zero point using the laser pointer and the system knows the location of all additional tools and can automatically handle them while cutting a program. Adding tool offset in your cutting program is not required.

3.14.2 Line Marking

Marking speed

This is the speed selection for the marking tool.

SD1, SD2 and SD3

These delays are typically not used when using plasma as the marking device, but are fully available and programmable.

SD4

Typically used for starting the Initial Height Sensing and igniting the marker.

Move Delay

Delay before motion will begin.

ED1

Typically delay to wait the arc to extinguish.

ED2

This delay is typically not used.

ED3

This is the time that the controller waits after the marking is completed (torch up), before commanding the machine to move to the next position.

3.14.3 Point Marking

SD1

This delay is typically not used but is fully available and programmable.

SD2

Typically used for a marker down delay. This is the time that it takes for the marker to descend to marking height.

SD3

This is the marking time, or the time the marking takes place. If using plasma as the marker device this would be the depth of the mark.

SD4

This is a marker-up raise time, or the time it takes for the marker to climb up to travel height.

Move Delay

This delay is typically not used.

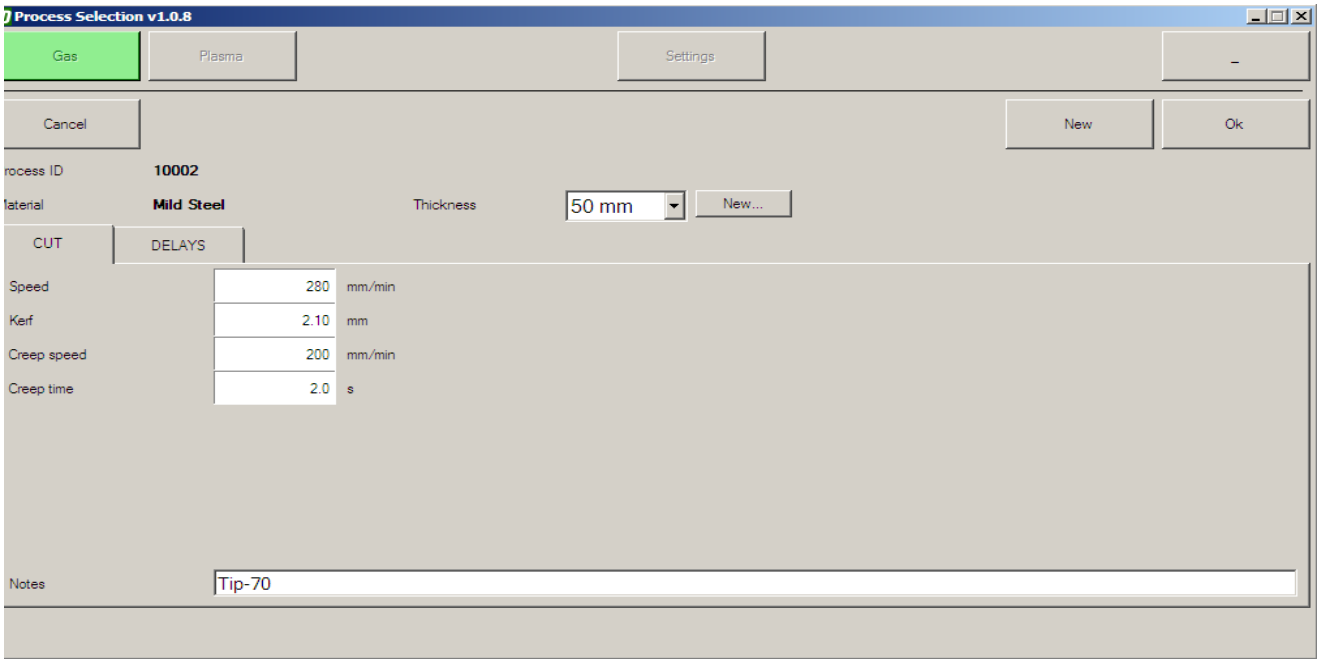
Rapid

This delay is typically not used.

3.14.4 Edit and create a process

Process Database

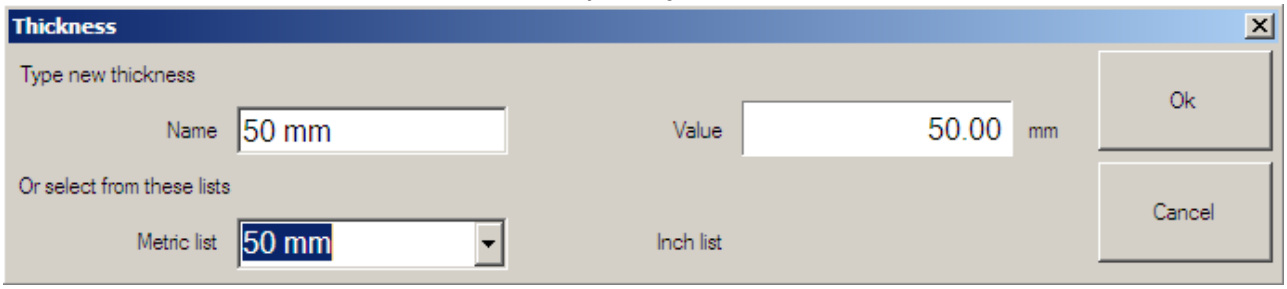
The iCNC Performance has a unique feature that allows building a database for specific cutting parameters based on material, thickness, gas and tool. Based on material, thickness and tool selected, the cutting parameters can change automatically for kerf, cutting speeds and other parameters. Once a database is built up with all the correct information, the guess work of where to set the cutting parameters will be minimized. This would be helpful when a new operator is trained to operate the cutting machine assuring consistent cut quality.



NOTE!
It is not necessary to use all three fields to set the database e.g. use material and thickness only and leave tool at Default.

Setting up the Database

1. Click Edit on the process selection screen and then click New.
2. Select the wanted Thickness or create a new thickness by clicking New.



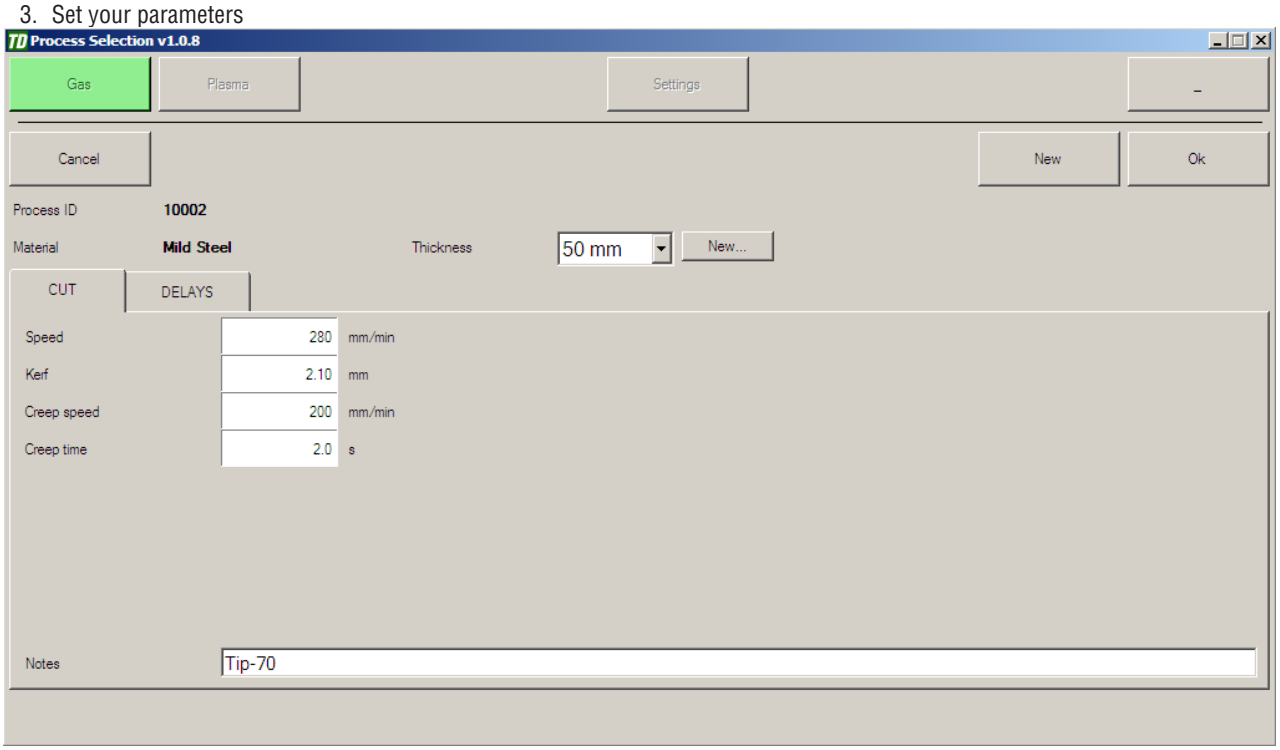
Name Thickness that is shown in the process selection.

Value Thickness that is used internally (example the process list is arranged by the value not by the name).

Metric/Inch list Pick a common thickness from the list.

Click Ok after thickness settings have been set.

3. Set your parameters



Speed

This is the machine cutting speed. This setting duplicates the cutting speed setting in folder 1 Parameters. Changing one, changes the other.

Kerf

The process kerf.

Creep speed

The initial speed of the cutting torch will immediately be activated after the start command is given. The duration of this speed is determined by the setting of the Creep Time parameter. This 'ramp-up" speed is used only shortly, to assist with piercing. After the creep time is over the torch accelerates/decelerates to the normal cutting speed.

Creep time

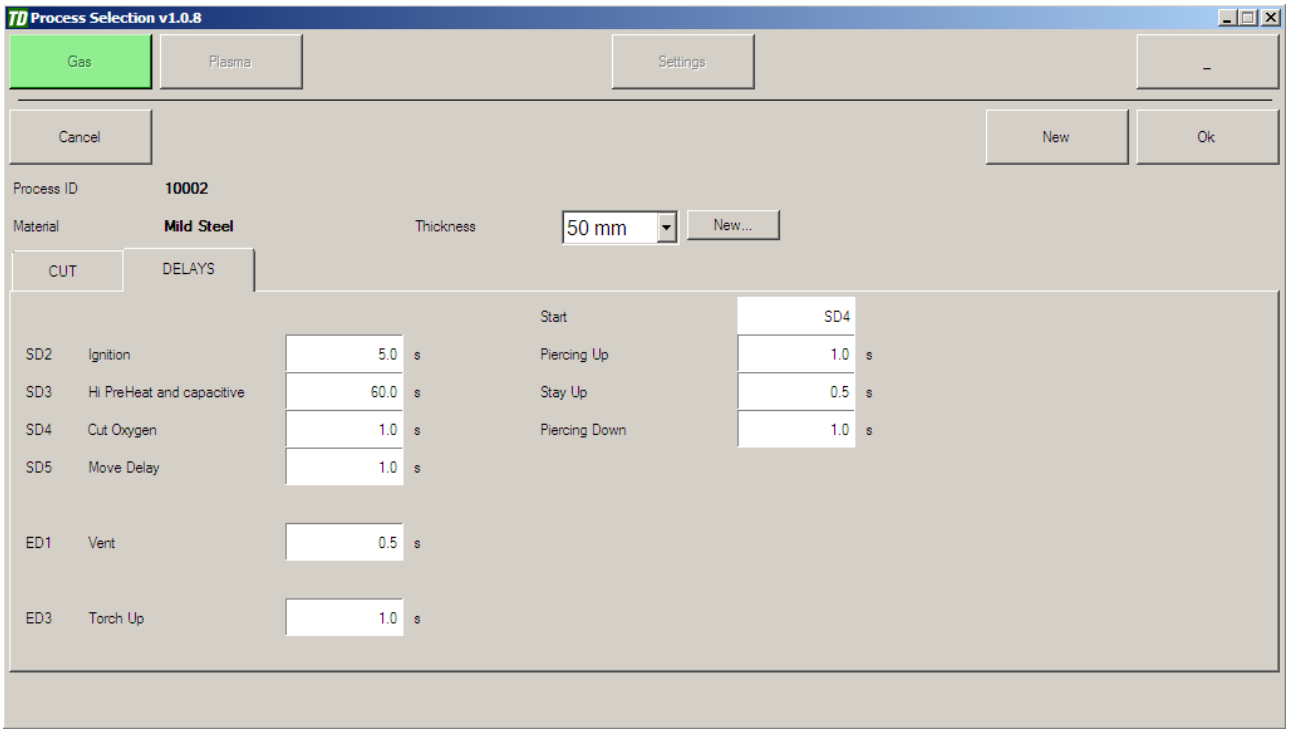
Length of the time for using the creep speed.

Note

Allows the operator to put notes corresponding the changes that were made to the process.

3.14.5 Cutting Parameter Delays

NOTE!
Parameter windows may alternate based on the machine setup. If a delay is not shown it is set as hidden. Delays can also be locked so that editing the time value is not possible . See installation/service manual about setting delays.
Pictures for reference only.



SD1 is generally not used but is fully programmable.

SD2 provides a time for igniting the torch. The ignition output is activated for this user selectable time. After time has elapsed the igniter will turn off. To override the feature in the event that the machine is not equipped with auto ignition, set timer value for SD2 to zero.

SD3 is generally used for a high preheat timer and turning capacitive height sensing ON. This determines the time allocated for pre-heating the material before piercing. The time is user defined based on the type of material and thickness. The thicker the material, the higher the timer value. To override the feature in the event that the machine is not equipped with auto high preheat, set timer value for SD3 to zero.

SD4 is generally used for Cut Oxygen. This determines the time allocated for heating the material with cutting oxygen, normally with thicker materials. This is best used with the pierce Up/Down function (See below).To override the feature in the event that the machine does not need extra pierce with cutting oxygen, set timer value for SD4 to zero.

Pierce up/down event timing: Activating the feature.

1. START: Select the start delay at which the timing is to begin execution, eg. SD4.
2. PIERCING UP: Enter the desired time to raise the torch for piercing.
3. STAY UP: Enter the desired time to stay up before the pierce lowering time begins.
4. PIERCING DOWN: Enter the desired time to lower the torch to the cutting height.

NOTE!
The piercing up and piercing down timer values are usually set to equal amounts as not to create a ramping or stepping effect. This is also true with the primary raise and lowering of the torch when no automatic capacitive height sensor is installed.

Examples: SD4 starts the event timing sequence for piercing up/down routine. The initial values for piercing up time - stay up time and piercing down time are set to 1 second for this example.

1. Cutting oxygen turned on as torch raises to piercing height. Set SD4 value from .1-.9 seconds.
2. Cutting oxygen turned on during stay up time. Set SD4 value from 1.1-1.9 seconds.
3. Cutting oxygen turned on while torch lowering to cutting height. Set SD4 value from 2.1-2.9 seconds.

Start Move Delay is the time allocated for the initial piercing through the material. After this time has expired, motion automatically begins.

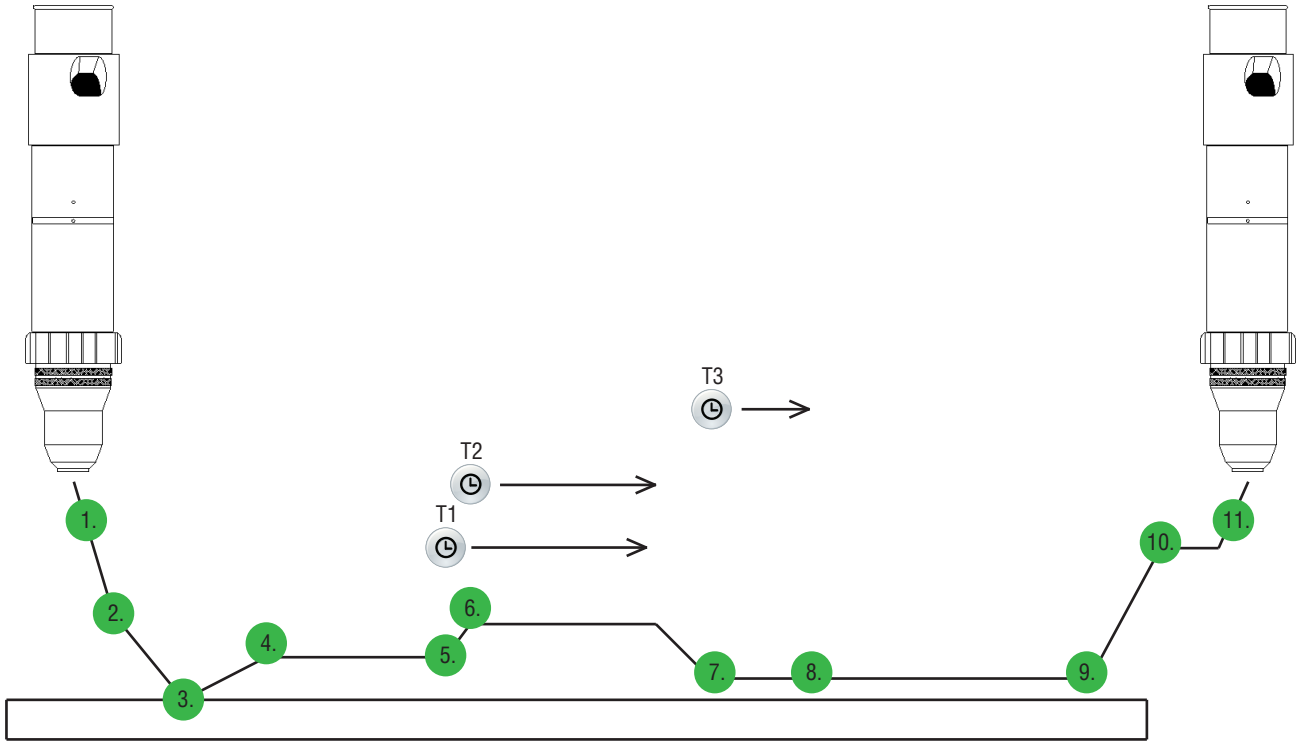
ED1 is the first delay executed after the program is finished or the cut manually interrupted by the operator. This delay is usually used for the primary raising of the torch after completion of the current cut. This allows the torch to clear any parts, which may have tipped up preventing damage or misalignment of the torch. Set the value to zero to prevent the torch from raising after completion of a cut.

ED2 is typically not used.

End Move Delay is typically used to allow excess cutting oxygen to bleed off through the cutting tip before rapid traverse to the next piercing location occurs. This prevents the cutting stream from nicking prior cut parts when the traverse path is directed over a part. Typically set to 1-2 seconds when the cutting oxygen valve is located on the inlet of torch. If the cutting oxygen valve is located on the gas manifold, allow additional time.

SECTION 4: iHC

4.1 Pierce/Cut Sequense

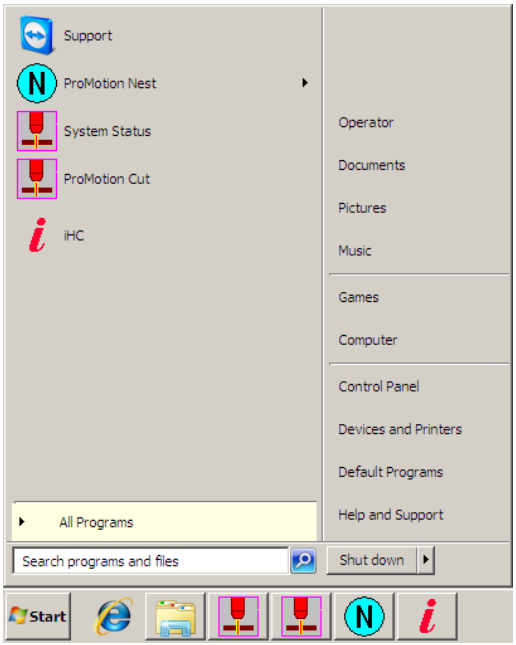


Pierce/Cut Flow Sequence:
1. IHS Start activated torch starts to find the plate.
2. Torch reaches slowdown height and starts to move slowly.
3. Torch touches the plate.
4. Torch moves to ignition height and gives command to start the plasma.
5. Plasma arc ignites and gives ok to move signal to the height controller. Pierce time T1 starts
6. Torch moves to pierce height. Pierce height delay T2 starts
7. After Pierce time T1 ends iHC XT Ok to move signal output activates and cutting motion starts.Torch moves to cut height after pierce height timer ends.
8. AVC control starts after AVC delay T3 ends.
9. Cuth path ends.
10. Torch moves to retract height.
11. If idle for long enough torch retracts to home position.

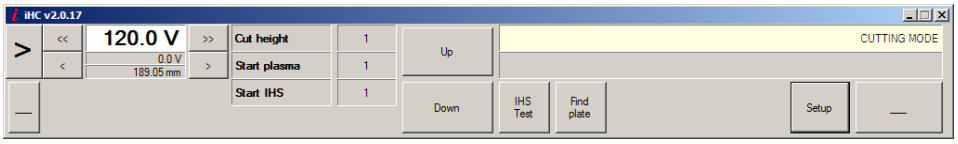
4.2 iHC User Interface

The iHC can be almost invisible to the operator because the Height Control Parameters can come from the cutting program or fully automatically from the Material/Thickness/Tool parameter sets. This window does not hide any controls normally used to run the iCNC Performance it can be viewed at all times. This chapter describes the User Interface at the controller when the automatic parameter setting features are not in use. This allows for changes at the time of cutting and/or settings before starting to cut.

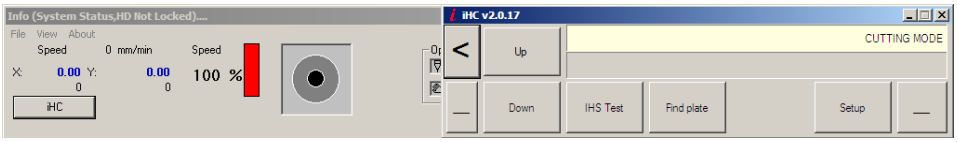
To start the software select “iHC.exe-Shortcut” from the Windows Start menu.



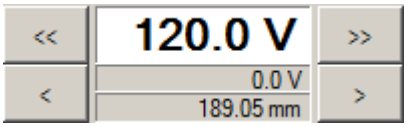
Main Bar



The large right pointing arrow can be used to make the iHC main bar smaller. This allow operator to see position and other information about the machine.

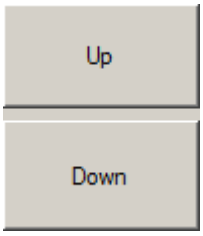


- On the left side of the main window there is a display showing the set value for Arc Voltage. The Arc Voltage can be modified using the left and right arrows on the sides of the slider. One click changes the voltage 1V or 0.1V.

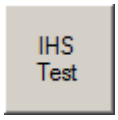


- If AVC Sampling is used the left side of the main window will show the cutting distance. One click changes the cut height 0.5mm or 0.1mm.

- The “UP” and “DOWN” buttons can be used to move the torch in manual mode.



- **IHS Test** button causes the torch to drive down to find a plate. This feature can be used to test that the iHC plate sensing works properly. The text on IHS Test button changes to “Cancel” after being pressed. Clicking “Cancel” returns the torch immediately to the home position. Torch will stay at ignition height after plate has been sensed.



- **Find Plate** feature is used when thicker material is placed on the table, this feature is used before the cutting process to make sure the torch will not collide to the plate on first piercing point. “Find Plate” uses the Find Plate Speed to conduct the Plate Contact Test. After finding the plate, the torch returns to Home Position. When “Find Plate” is clicked, the text on the button changes to “Cancel”. Clicking “Cancel” returns the torch immediately to the home position

- Clicking on “SETUP” opens the Setup window.

- The iHC window can be minimized with the button on the far right that looks like a dash.

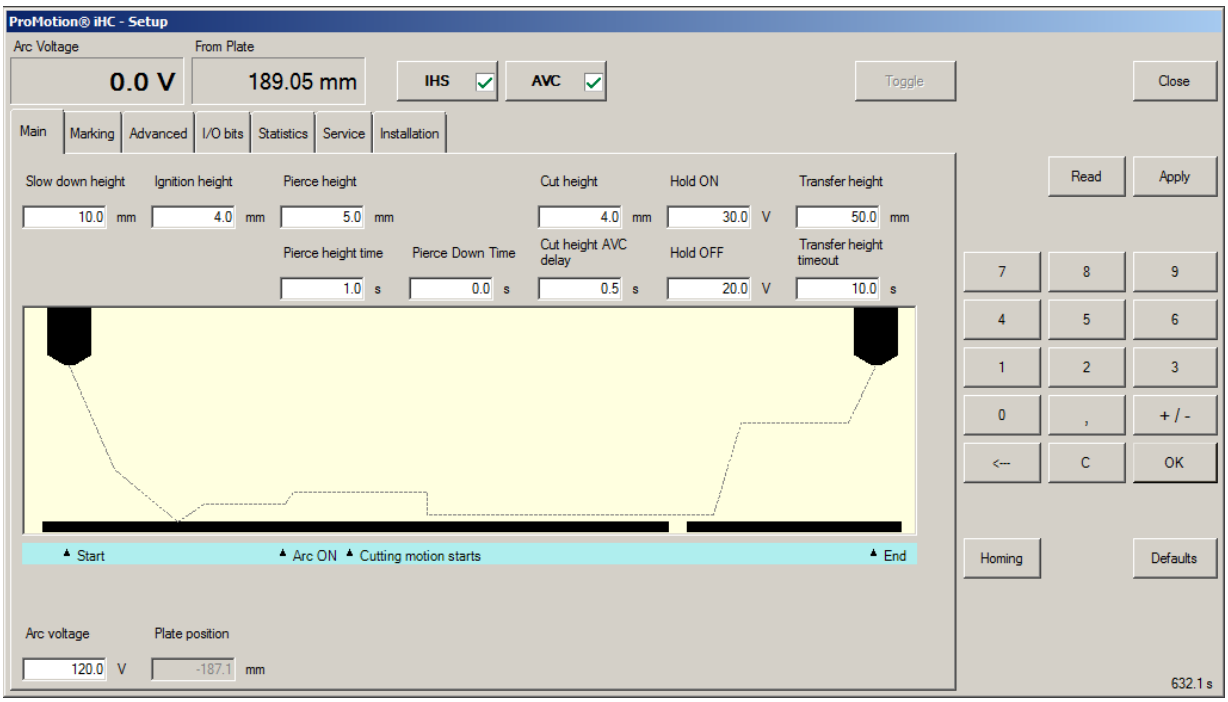
- There are two text fields at the top right corner of the iHC window. In a normal situation it should read “Cutting Mode” in the upper field. If the height control isn’t running or there is a connection problem it reads “WAITING FOR REPLY...” on the lower text field. Lower text field will also show status messages like lower software limit.

- You can monitor the status of the station by viewing colors changing on the screen. The number field on the right from the cut height text shows when the AVC is active, when IHS start is ON and when the torch is in cutting height.

Cut height	1
Start plasma	1
Start IHS	1

4.3 Main Settings

Clicking the “Setup” button will open the Setup Main screen under the iHC Info Bar.



This screen

- Continuously displays the actual Arc Voltage and the height of the torch from the plate (the height where the plate was sensed at the time of pierce).
- Has various tabs for more options.

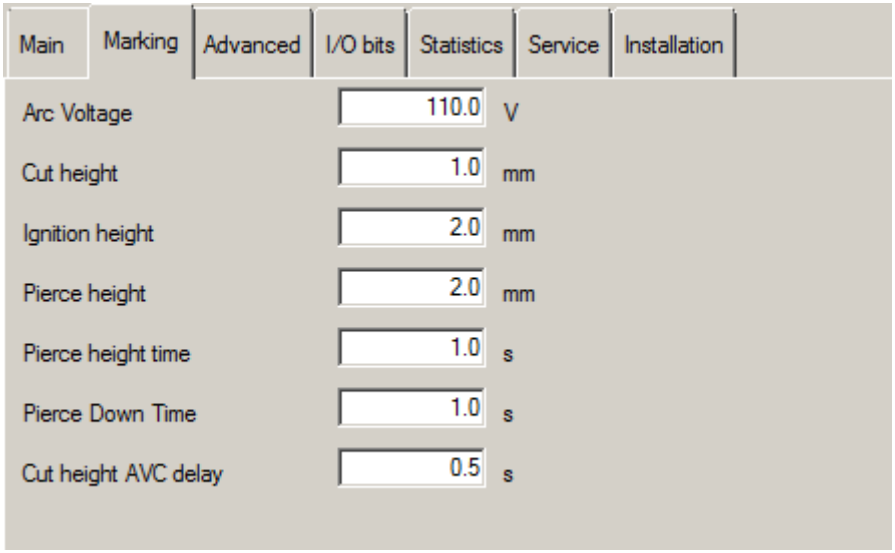
Most of the parameters of the iHC can be directed in the Setup window. The upper middle part of the Setup-window consist of buttons and fields which are always displayed.

This screen is used for intuitive setting of iHC operation parameters. When setting any of these parameters the process diagram visually indicates what each parameter means.

- **Slow Down Height** is the distance from the last known plate height where the lifter should slow down the motion for plate sensing to avoid a hard hit.
- **Ignition Height** determines the distance from the plate where the torch will be ignited.
- **Pierce Height** determines the distance from the plate where the actual piercing will be done after igniting the torch.
- **Pierce Height Time** determines how long the torch will stay on pierce height.
- **Pierce Down Speed** determines the transfer speed from pierce height to cut height.
- **Cut Height** determines the torch height for cutting after piercing is complete.
- **Cut Height AVC Delay** determines the time given for the arc voltage to stabilize after reaching the cut height to allow for control of the torch height based on measured Arc Voltage (also proper cutting speed is required).
- **Hold ON** Cutting voltage increase required to freeze torch motion while crossing kerf
- **Hold OFF** Cutting voltage increase below while torch motion recovers to AVC control
- **Transfer Height** determines the height where the torch will be lifted after the cut for rapid transfer to the next pierce point. Use high enough value to avoid collisions.
- **Transfer Height Timeout** determines how long the system waits at this height for the new pierce command before lifting the torch all the way up to home position.
- **Arc Voltage Display** shows actual arc voltage in real time when cutting is active.
- **Plate Position** shows where the plate was last sensed in comparison to the Torch Lifter Home position.

4.4 System Setup & Diagnostic Menus

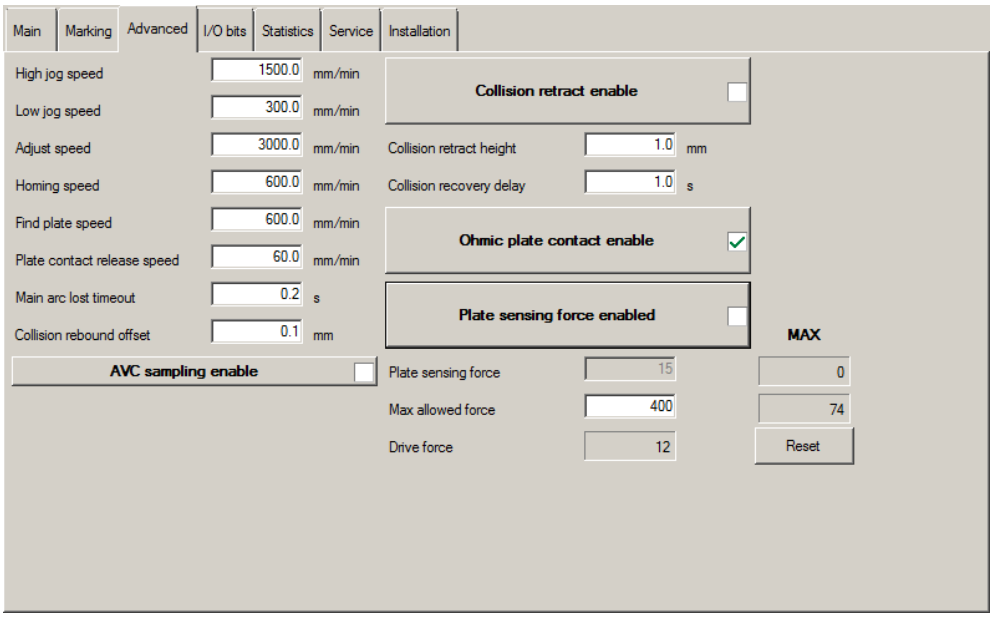
4.4.2 Marking Tab



- **Arc Voltage**, used when marking
- **Cut Height**, used when marking
- **Ignition Height**, used when marking
- **Pierce Height**, used when marking
- **Pierce Height Time**, used when marking
- **Pierce Down Time**, used when marking
- **Cut Height AVC Delay**, used when marking

4.4.3 Advanced Tab

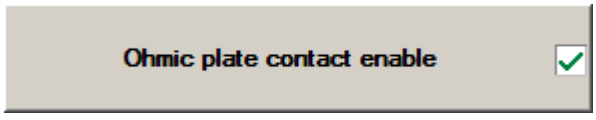
Provides the option for more detailed control of the system behavior.



Default Values	Imperial	Metric
High Jog Speed	59,06 IPM	1500 mm/min
Low Jog Speed	11,81 IPM	300 mm/min
Adjust Speed	118,11 IPM	3000 mm/min
Homing Speed	23,62 IPM	600 mm/min
Find Plate Speed	23,62 IPM	600 mm/min
Plate Contact Release Speed	2,36 IPM	60 mm/min
Main Arc Lost Time Out	1 s	
Collision Rebound Offset		
Hold Off AVC Delay	0.0 s	
Collision Retract Height	0.4”	1mm
Collision Recovery Delay	1 s	
Plate sensing force	25	
Max allowed force	250	

- **Collision retract enable** Enables the collision retract feature that lifts the torch when plate contact has occurred while cutting. This feature is mainly used to protect torch consumables from hot slag emerging on top of the plate after piercing. Higher pierce height must be used to protect consumables while piercing. If Collision Retract activates all the time while cutting, check system for proper cutting speed, arc voltage and gas pressure. Note that on small radius holes while using lower speeds the slag might shoot up to the torch and retract the torch if this occurs and hole quality is more important than consumable life you can disable this feature.

- **Collision retract height** sets the height for the torch where it retracts to, after plate contact has occurred while cutting is active
- **Collision recovery delay** determines how long the torch will remain in the collision retract height until automatic height control is activated again
- **Ohmic plate contact enable** using this function requires a connection between the torch shield cap and the voltage divider. This method is more accurate and sensitive than the Plate sensing by force. Ohmic plate contact enable should always be used as the main plate sensing feature if possible. This function is not usable when cutting under water.



4.4.4 I/O Bits Tab

This tab displays the status of various system signals for diagnostic purposes. I/O bits are separated to inputs (signals that come from other devices to iHC) and outputs (signals that go from the iHC to other devices).

Inputs

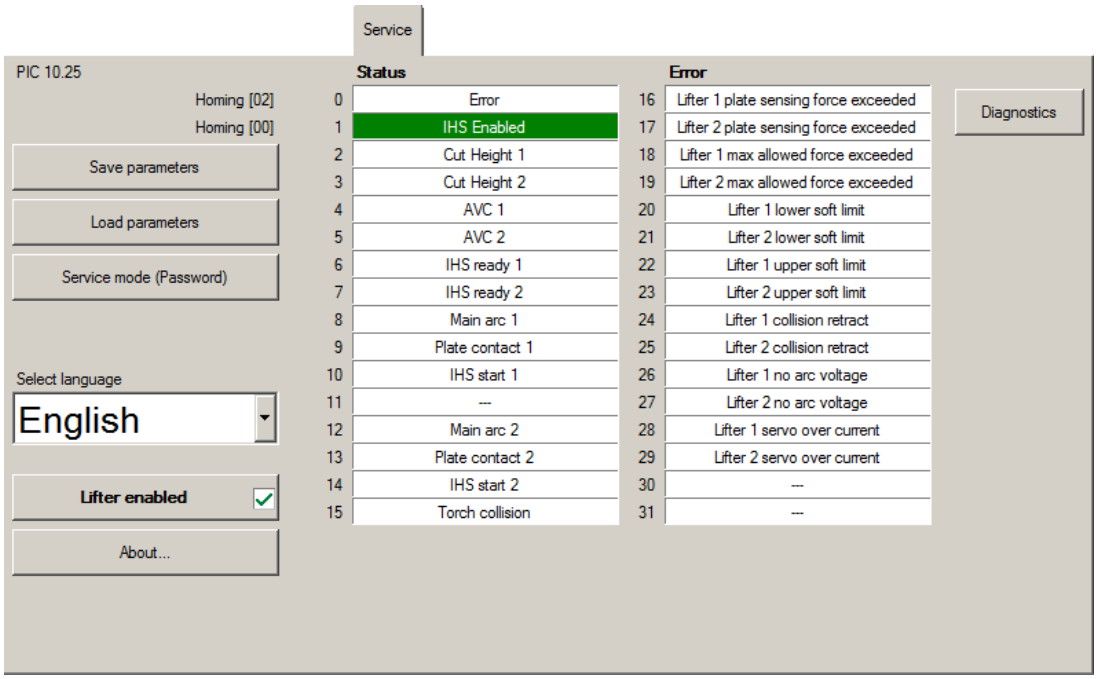
1. **Torch Collision** in case the lifter has a breakaway/collision sensor, signals from the sensor can be wired into Torch Collision input. Torch Collision will activate System Error output to CNC
2. **Upper Limit Switch** used to find home position when iHC is turned on
3. **Plate Contact** inbit becomes active on plate contact during IHS or cutting sequence.
4. **IHS Start** inbit from CNC becomes active when the IHS sequence starts.
5. **Main Arc** inbit from plasma which indicates plasma arc has ignited.
6. **Marking** inbit to put height controller to marking mode.
7. **Hold** AVC turns off when Hold inbit turns active. Hold is used during cutting to prevent the torch from diving into the plate when movement slows down ie: during tight corners.
8. **Up** inbit from CNC that moves the torch up.
9. **Down** inbit from CNC that moves the torch down.
10. **Laser pointer** inbit from CNC to turn on the laser pointer output
11. **Motor power** inbit telling is the motor power turned ON.
12. **Maintain ARCV** reserved for future use.
13. **Optional** reserved for future use.

Outputs

14. **System Error** (Inverted) can be connected to CNC controllers external stop
15. **Optional** reserved for future use
16. **Sense Relay** 24VDC Output for voltage divider board.
17. **IHS Active** outbit which is active form the time IHS Start turns active until Ignition Height has been reached.
18. **Main Arc** outbit to CNC which becomes active when the main arc inbit is activated and the transfer delay has passed.
19. **Marking** outbit to turn ON the marking output.
20. **Plasma Start** outbit to tunr on the plasma start output.
21. **Stepper Enable** step motion enabled/disabled.
22. **Stepper Direction** DIR signal active.
23. **Stepper Pulse** step pulse signal active.
24. **Laser pointer** outbit to turn ON the laser pointer output.

4.4.5 Service Tab

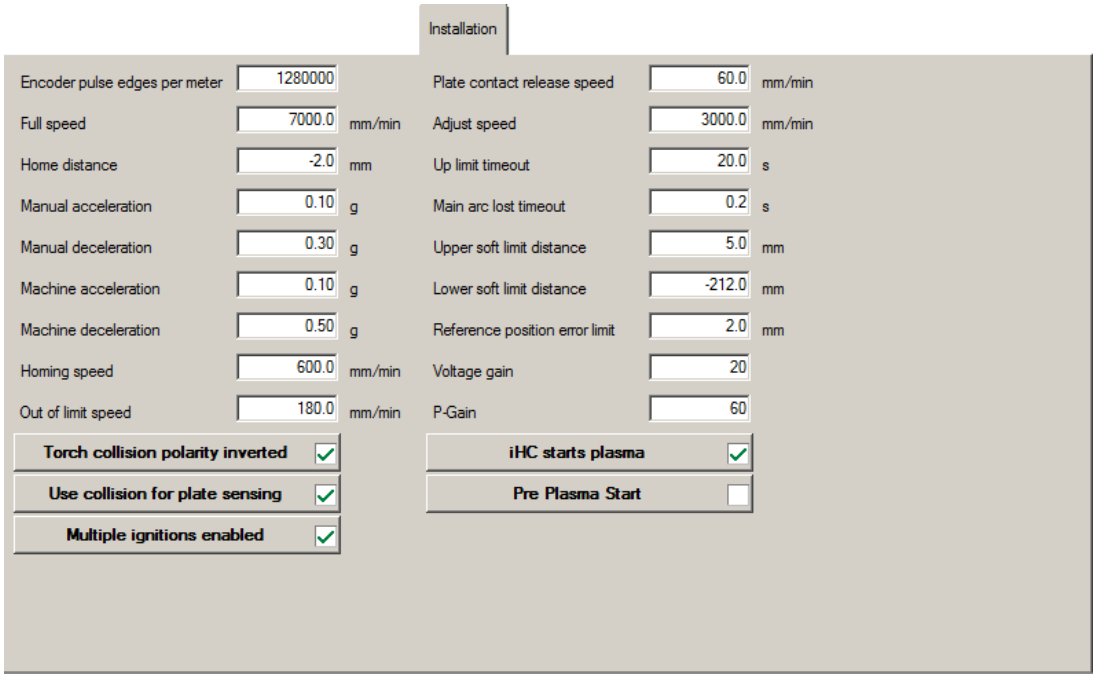
This window contains information about iHC software version, status and errors. Also displays the following:



- **Save parameters** Saves current parameters, only available in service mode
- **Load parameters** Loads saved parameters, only available in service mode
- **Enter service mode** Enables the use of functions and parameters only available in service mode
- **Select language** Select the language in use

4.4.6 Installation Tab

These parameters are password protected. Some parameters are the same as on the Advanced Tab.


Installation
Encoder pulse edges per meter 1280000
Full speed 7000.0 mm/min
Home distance -2.0 mm
Manual acceleration 0.10 g
Manual deceleration 0.30 g
Machine acceleration 0.10 g
Machine deceleration 0.50 g
Homing speed 600.0 mm/min
Out of limit speed 180.0 mm/min
Plate contact release speed 60.0 mm/min
Adjust speed 3000.0 mm/min
Up limit timeout 20.0 s
Main arc lost timeout 0.2 s
Upper soft limit distance 5.0 mm
Lower soft limit distance -212.0 mm
Reference position error limit 2.0 mm
Voltage gain 20
P-Gain 60
Torch collision polarity inverted
Use collision for plate sensing
Multiple ignitions enabled
iHC starts plasma
Pre Plasma Start

- **Encoder pulse edges per meter** Determined by the type of encoder and the threaded shaft of the lifter.
- **Full Speed** The maximum speed of the lifter. Full Speed is used above Slow Down Height.
- **Home Distance** The distance of the home position from the limit switch.
- **Manual Acceleration & Manual Deceleration** Used on jog, when AVC is on.
- **Machine Acceleration & Machine Deceleration** used when the software drives the lifter.
- **Homing Speed** The speed used in the homing process.
- **Out Of Limit Speed** The speed used when the torch is moving out of limit switch.
- **Plate Contact Release Speed** The speed used when driving out of plate until contact is released.
- **Adjust Speed** Used in arc-voltage control process to determine the maximum control speed of the lifter
- **Up Limit Timeout** When moving up, the torch halts after this timeout if the limit switch is not found.
- **Main Arc Lost Timeout** Typically 0.1s to avoid losing the cut without real cause.
- **Hold OFF AVC Delay** Additional delay after Hold OFF which can be useful after piercing and in corners.
- **Upper Soft Limit Distance** Upper soft limit which is located above the limit switch. The position of the upper soft limit is determined by adding the Upper Soft Limit Distance to the position of the limit switch.
- **Lower Soft Limit Distance** Lower soft limit which is located below the plate. The position of the lower soft limit is determined by subtracting the Lower Soft Limit Distance from the position of the limit switch. Lower soft limit is supposed to be determined so that short motion below table surface is allowed but limiting the lifter from hitting the hard stop of the lifter.
- **Reference Position Error Limit** If there is a cumulative error in the position of the limit switch, the Reference Position Error Limit determines how large of an error can be tolerated. If the Reference Position Error Limit is exceeded, the torch performs homing
- **Voltage Gain** Determines how much force the system uses to correct the difference between the actual voltage and the target voltage.
- **P-Gain** Used to tune the movement. Too large of a value can cause the lifter to oscillate and too small of a value makes the movement soft and inaccurate.
- **I-Gain** Used to fine-tune the movement of the lifter.
- **Torch collision polarity inverted** Select NC or NO use of a collision sensor.

4.4.7 Parameter Limits

Parameter name	Default	MIN	MAX
Adjust speed	3000mm/min	60	18000
Collision recovery delay	1s	0	10
Collision retract height	1mm	0	100
Cut height	1mm	1	50
Cut height AVC delay	0,2s	0	10
Manual acceleration	0.3g	0,3	5
Manual deceleration	0.3g	0,3	5
Encoder pulses per meter	500000p/m	0	2^31
Find plate speed	600mm/min	60	5000
Full speed	6000mm/min	60	50000
High jog speed	3000mm/min	60	20000
Hold off AVC delay	0	0	10
Hold off limit	8	0	100
Hold on limit	10	0	100
Home distance	-2	-100	100
Homing speed	2000	60	20000
I-Gain	0	0	2^31
Ignition height	2	1	50
Low jog speed	300mm/min	120	10000
Lower soft limit distance	-1000mm	-1000	0
Machine acceleration	0.1g	0,3	5
Machine deceleration	0.3g	0,3	5
Out of limit speed	180mm/min	60	2000
P-Gain	80	0	2^31
Pierce down time	0s	0	10
Pierce height	2mm	1	50
Pierce height time	1s	0	10
Plate contact release speed	60mm/min	60	10000
Reference position error limit	2mm	0	10
Slow Down Height	10mm	1	1000
Touch Current Limit	5	0,05	20,4
Transfer Height	50mm	0	500
Transfer Height Timeout	10s	0	20
Up Limit Timeout	20s	1	120
Upper Soft Limit Distance	5mm	0	1000
Voltage Gain	10	1	256

SECTION 5: NEST

5.1 ProMotion® Nest

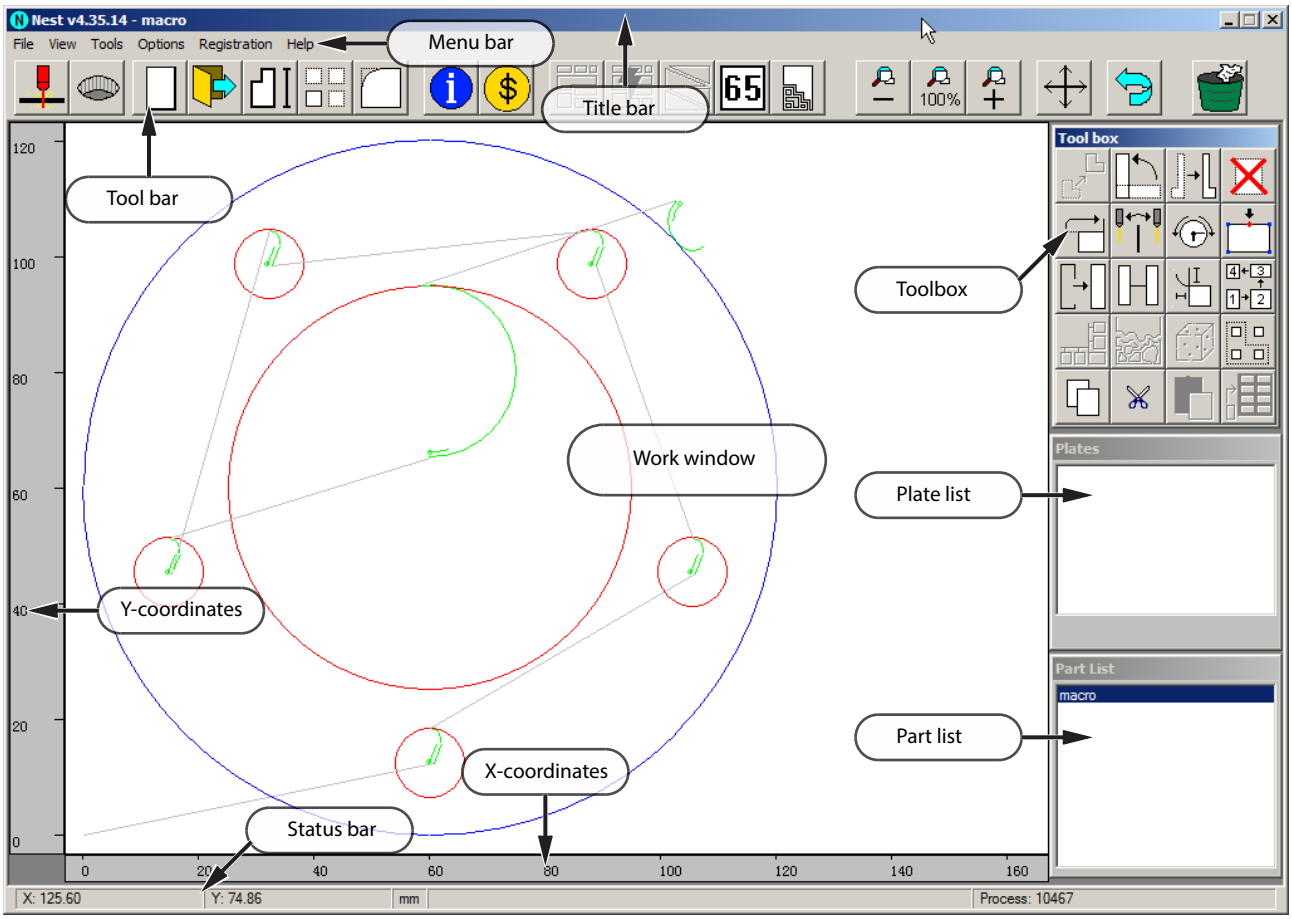
ProMotion® Nest is software which converts CAD pictures (DXF format) to cutting programs. It is also possible to modify existing cutting programs (EIA, ESSI or CNC-2 format).

Basics

When ProMotion® Nest loads a CAD picture it adds cutting technology (kerf side, piercing points, cutting order, etc.) to shapes automatically. If you want, you can easily change any of those settings. Copy the shapes to a plate, nest, set cutting order, etc. and either send the cutting program to ProMotion® Cut or save it for later use.

ProMotion® Nest user interface

ProMotion® Nest user interface is a collection of several small windows, buttons and bars. Below is a brief description of all of them.



Title bar

The Title Bar is at the top of the ProMotion® Nest window. It contains the version number, the name of the registered user and the name of the active job.

Menu bar

The Menu Bar lies just below the Title Bar and allows you to choose one of the following:

File Menu

View Menu

Tools Menu

Options Menu

Registration Menu

Help Menu

Toolbar

The Toolbar lies just below the menu bar. The Toolbar contains buttons for quick access to most of the important tools of ProMotion® Nest (i.e.: load, save, macros). See more at chapter Toolbar.

Work window

The Work Window is the large white area in the middle of the screen. The Active Job is displayed here and editing is also done here.

Coordinates

Y-coordinates are displayed on the left side of the work window and X-coordinates are just below the work window.

Status bar

The Status Bar lies at bottom of the ProMotion® Nest window. The Status Bar displays messages and hints from ProMotion® Nest . It also displays the current coordinates of the mouse cursor, when it is on in the work window.

Toolbox

The Toolbox is located at the top right corner of the ProMotion® Nest window. It contains buttons for most editing tools. - 3 - © 1997 - 2012 Victor Technologies ProMotion® Nest ProMotion® Nest v4.32

Plate list

The Plate List is located just below of the toolbox. The Plate List contains a list of all plates loaded to ProMotion® Nest. See “Plate list” for more information.

Part list

The Part List is located at the bottom right corner of the ProMotion® Nest window. The Part List shows all of the shapes loaded to ProMotion® Nest. See “Part List” for more information.

5.2 Toolbar

ProMotion® Nest toolbar looks like this:

Here is a brief description of each tool:

Send to cutting Sends the current nesting to ProMotion® Cut and activates it.

New Plate Creates a new plate. See more info at topic New Plate under File Menu

File open Opens a CNC or a DXF file.

Macro Starts the macro tool. See more info at topic Macro under File Menu.

Rows and Columns Multiplies part or parts. See more info at topic Rows and Columns.

MicroCAD Starts the MicroCAD tool. See more info at topic MicroCAD.

NestInfo Activates the NestInfo window. See more info at topic NestInfo.

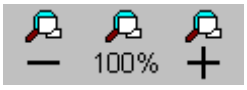
Cost Calculator Activates the Cost Calculator tool. See more info at topic Cost Calculator.

Nest Automatic nesting. See more info at topic Nest.

Feed Rates Add feed rates to your cutting program. See more info at topic Feed Rates.

Optimized Holes Add optimized cutting parameters for holes to get best possible cutting quality. Requires ProMotion® Optimizer software.

Plate Editor Edit the plate with this tool. See more at chapter Plate Editor.



Zooming See more at Zooming.

Pan You can pan the view by moving the mouse cursor over the work window and pressing the left mouse button or keep your mouse wheel button pressed in to pan.

Undo Undoes the last editing you made for the current nesting.

Trash Trashes the current nesting.

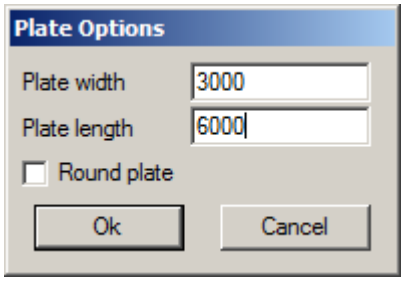
5.3 Toolbar Functions

5.3.1 Send to Cutting

When the nesting is ready for cutting click this button to send it to ProMotion® Cut.

5.3.2 New Plate

When you activate this tool a window appears asking the length and width of the new plate.



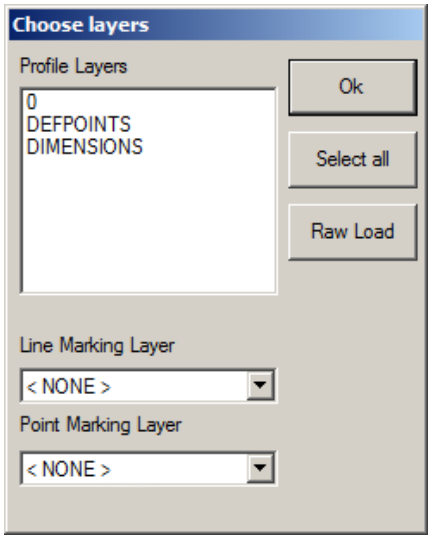
Insert the values, click Ok and a new empty plate appears. The name of the plate appears in the Plate List.

To create round plates simply check the round plate option and enter the diameter of the circle.

5.3.3 Open

Opens a file. ProMotion® Nest can open DXF, EIA, ESSI, CNC-2 and DSTV files

DXF-files:



If you load a file that is in DXF-format and that file includes more than one layer, ProMotion® Nest will ask you to select which layers are loaded to the nesting.

If there are line and/or point markings in the DXF-file, they must be in their own separate layers. Line and point marking layers are chosen in the same dialog as the profile layers. In the example above the layer “PROFILES” is selected for containing the profiles. The layer “POWDER” is selected as line marking layer and there is no selected point marking layer.

Select all loads all layers to the nesting.

To speed up the loading process and to cut off all auxiliary elements (like measure lines) ProMotion® Nest starts to load elements from the DXF file after it has found a certain keyword from the file. Sometimes there is a need to load elements before that keyword. Raw Load is made for cases like this. It loads every possible element from the DXF file to your nesting.

Other files:

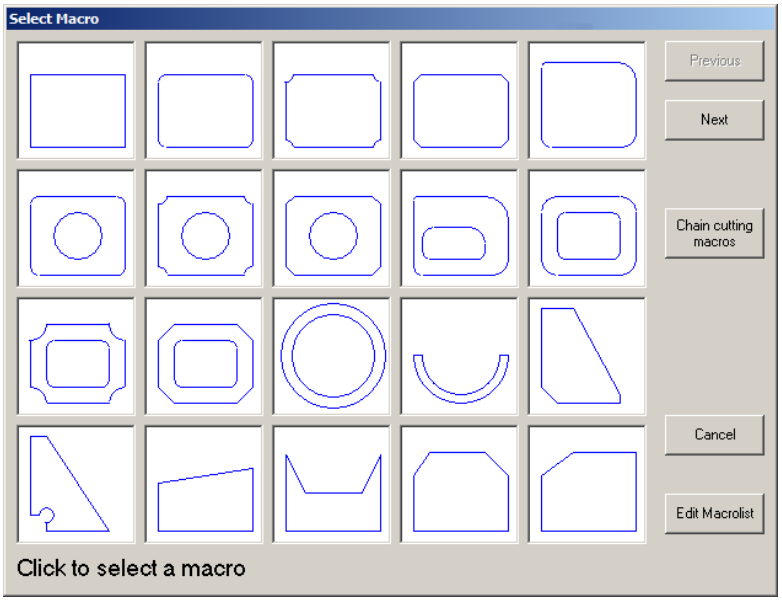
ESSI and EIA files don’t have any layers to choose. Just make sure that your options are set correctly.

See also Line and point marking.

Opening DSTV-files is an optional module

5.3.4 Macro Shapes

When you select this tool, the macro list window (picture 1) opens. This window displays small images of the available macros. There are only 20 macros displayed at a time, but you can see more macros by choosing “NEXT” and “PREVIOUS”.

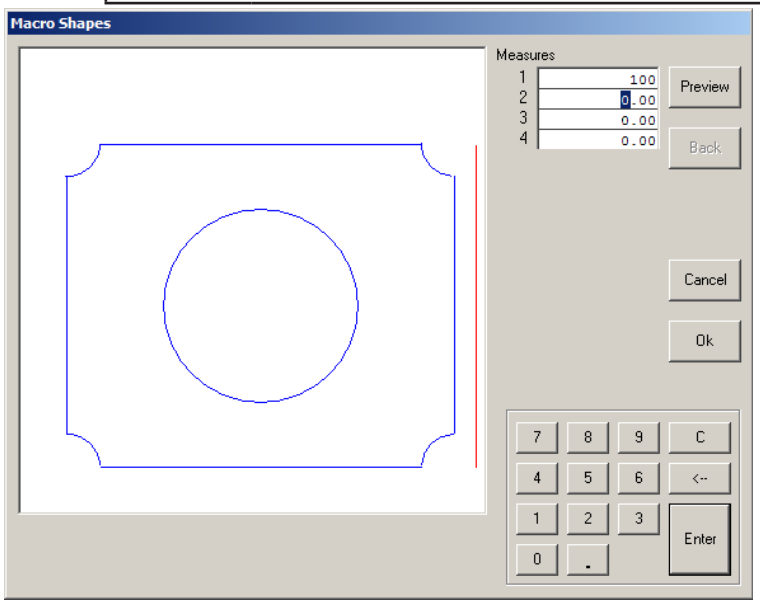


Picture 1.

Creating a new shape with macros

Select the macro you want by double-clicking it. The window below (picture 2) opens. Enter your measurements in the boxes provided. In the picture on the left side of the window you can see the shape and red lines. Those red lines are measure lines and they show you which measurement you are entering. When you have entered all the measurements, you can preview the shape by choosing “PREVIEW”. If you want to change the measurements after you have previewed them, simply choose “BACK” and adjust your measurements. When you are satisfied, choose “OK” and the shape appears in ProMotion® Nest’s work window.

NOTE!
You can input numbers by using the number pad or the wheel of your mouse.

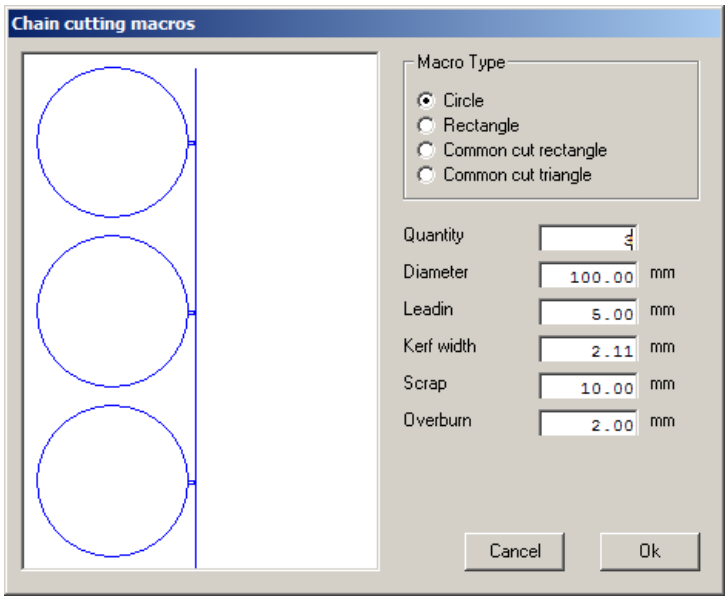


Picture 2.

Chain cutting macros

Chain cutting macros are simple shapes - circles, triangles and rectangles - which are cut in a single line with just one piercing. It is also possible to make common cut shapes, where two rectangles or triangles have one mutual side.

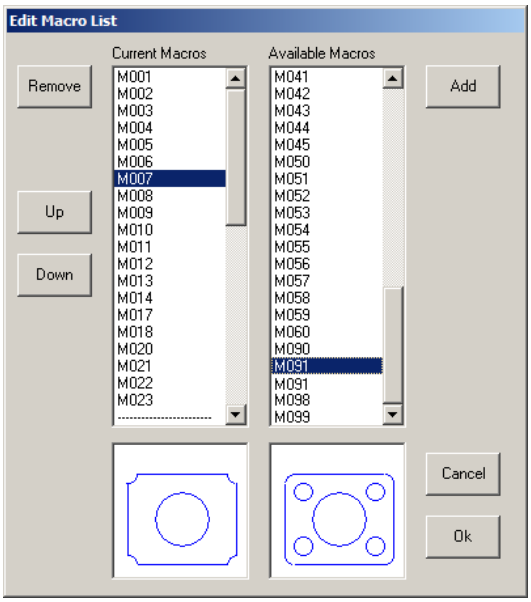
Using chain cutting macros is really simple. Just insert the correct parameter values and click “OK”. When you change the parameters you can see the effect of those changes immediately in the preview area.



Picture 3.

Editing the macrolist

Choose “EDIT MACROLIST” in the first window (picture 1) to open the macrolist edit window (see below). The list “CURRENT MACROS” shows the macros currently in the list. The list “AVAILABLE MACROS” shows all the macros, which you can add to the macrolist. The dashed line in the “CURRENT MACROS” list shows where the page break is. There can be only 20 macros visible in any time in the macro list (see picture 1).



Picture 4.

How to change the order of macros in the macro list:

- Select one of the macros in the list ’CURRENT MACROS “. The macro you selected is displayed in the small picture box just below the list.
- Choose “UP” to move the selected macro one step towards the beginning of the list.
- Choose “DOWN” to move the selected macro one step towards the end of the list.

How to remove a macro from the macro list:

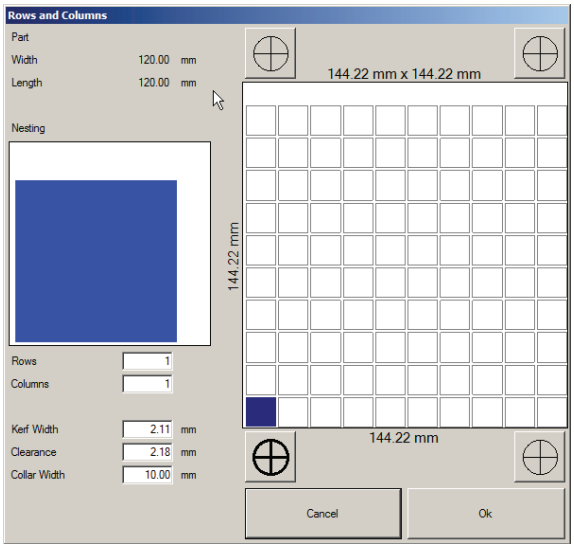
- Select one of the macros in the list “’CURRENT MACROS”. The macro you selected is displayed in the small picture box just below the list.
- Choose “REMOVE” and the macro you selected is removed from the list.

How to add a macro to the macro list:

- Select one of the macros in the list “AVAILABLE MARCROS”. The macro you selected is displayed in the small picture box just below the list.
- Choose “ADD” and the macro you selected is added to the end of the list.

5.3.5 Rows and Columns

Use this tool to multiply parts. You can set the number of rows and columns. The final number of copies will be rows x columns. For example 3 rows times 4 columns will result as 3 x 4 = 12 copies.



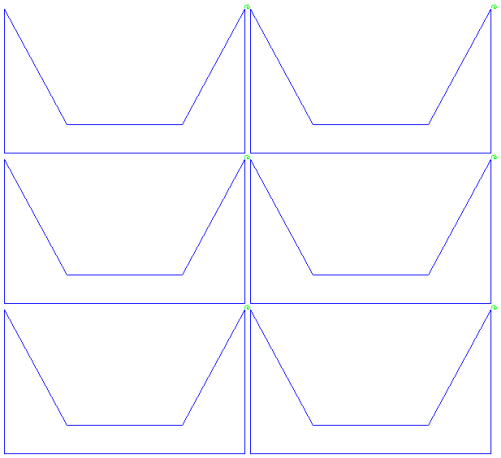
Rows defines how many rows of copies there will be.

Columns defines how many columns of copies there will be.

Kerf width The minimum kerf width is zero.

Clearance and kerf width define the distance between copies. The distance is clearance + 2 x kerf width. The clearance may also be negative, if you want to copy the parts closer to each other.

Hint: If you need different clearance values in X and Y directions, then do the columns first (rows = 1, colums = n) and then the rows (rows = m, columns = 1). This way you will get m x n copies. Please see the below picture as an example of negative Y clearance.



Collar width is an extra distance that is left on the edges of the nesting. This is used to avoid the edges of plate which may not be of good quality. For example if you have roughly a 50” x 50” plate, but the edges are not perfectly straight, then you can set the collar as 1” and the usable area is then 48” x 48”. The minimum collar is zero, but if the clearance is greater than the collar, then the clearance is used as the collar.

Required area shows the minimum width and length of the plate that the current parts need when multiplied and used the given parameters kerf, clearance and collar.

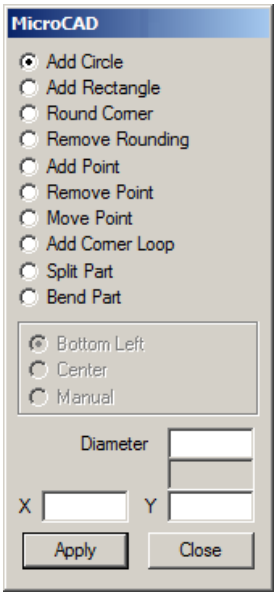
You can either type in a number to rows/columns or click the on the grid to create desired number of copies.

The crosshairs define the 0 reference point for the parts.

NOTE!
Kerf, clearance and collar are the same that are in the Nesting Options. If you change them here, their values are applied to the nesting options as well. The only exception is the clearance. If the clearance is negative here, automatic nesting still uses zero as the minimum clearance.

5.3.6 MicroCAD

Use this tool to edit profiles. The tools are described below.



Add Circle

Type the diameter and the coordinates of the center point to the corresponding text fields. Click Apply and the circle is added to the shape. The new circle will be the first one in the cutting order.

Add Rectangle

First choose the center point or the bottom left corner of the rectangle. Enter the length, width and the coordinates in the corresponding text fields. Click Apply and the rectangle is added to the shape. The new rectangle will be the first one in the cutting order.

Round Corner

Insert the radius of the rounding to the Radius text field and click Apply to verify the radius. Moving the cursor over a corner changes the cursor to a cross. Click the corner and it will be rounded with the radius you just set.

Remove Rounding

Changes arcs to two (2) lines. Move the mouse cursor over an arc and it changes to a cross. Click to remove rounding.

Add Point

Adds points (lines) to a shape. If the shape contains open profiles, the line is drawn from the last point of the first open profile to the point you added. If there are no open profiles, then new line (and profile) is created from the 0,0 point to the point you added. Adding new points is simple. Just type in the coordinates and click Apply.

Remove Point

Removes single points from a profile. Move the mouse cursor over a point and it changes to a cross. Click and the point is removed. If the point was the last or the first point of the profile, then the entire element is removed, otherwise the previous and the next point are connected with a line.

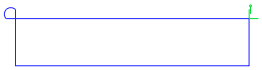
Move Point

This tool moves a point to another location. Click a point to select it (a small box appears over the point). Enter the new coordinates to the coordinate fields and click Apply. The point moves to the new location.

Add Corner Loop

This tool adds a loop to a corner. First select the radius of the loop and then left click the corner where you want the loop.'

Loops like this make it possible to cut very sharp corners.

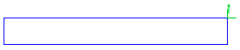


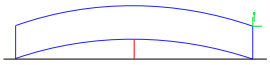
Split Part

This tool splits parts. Select the option and insert parameters if required, then apply and click the part you want to split. There are three options to split parts.

1. Equal length: Use this option to split part equally to a given number of parts.
2. Max length: This option splits the part maximizing the length of new parts. The max length of new parts is given as parameter.
3. Manual: Use this option to manually split parts. Hold the left mouse button down and draw a line across the part and then release the button. The part is split along that line you drew.

Bend Part

This tool bends a rectangular part. Set the bending value, apply, and then click on the part to bend it. 



The bending value is the height of the arc at its highest (center) point as shown in the picture above. Bending value is displayed as the red line. If there are any holes inside the part they are shifted accordingly, but they are not bent.

NOTE!
This tool can bend rectangles only. Any other shapes are bent incorrectly or not at all.

5.3.7 Nestinfo

NestInfo displays information about the current nesting. NestInfo contains following information:

Plate

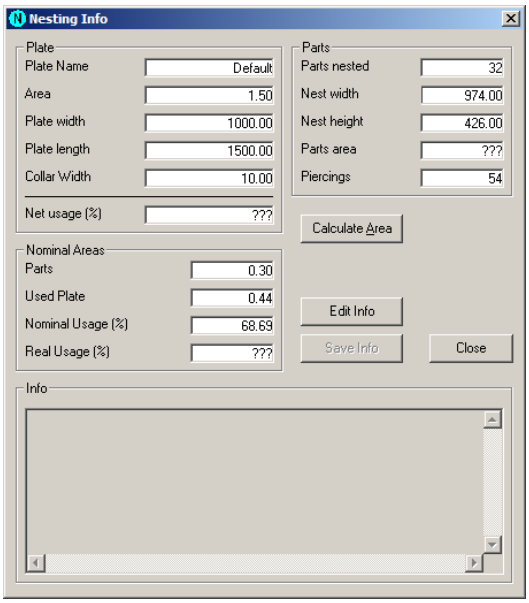
- Plate name - the name of the current plate.
- Area - the area of the plate. (square foot or square meters)
- Plate width (inches or millimeters)
- Plate height (inches or millimeters)
- Collar width - this is defined in Nesting Options.(inches or millimeters)
- Net usage (%) - the relation between the parts area and the plate area in percentage.

Part

- Parts nested - the number of parts in the nesting.
- Nest width - the width of the nesting.
- Nest height - the height of the nesting.
- Parts area - the total area of all parts. (square foot or square meters)
- Piercings - the number of the piercing points in the nesting.

Nominal Areas

- Parts - the total of all parts' nominal sizes.
- Used Plate - nominal size of used plate. This is exactly (nest width + 2 x collar width) x (nest height + 2 x collar width).
- Nominal Usage (%) - the relation between nominal size of all parts and used plate.
- Real Usage (%) - the relation between real area of all parts and used plate.



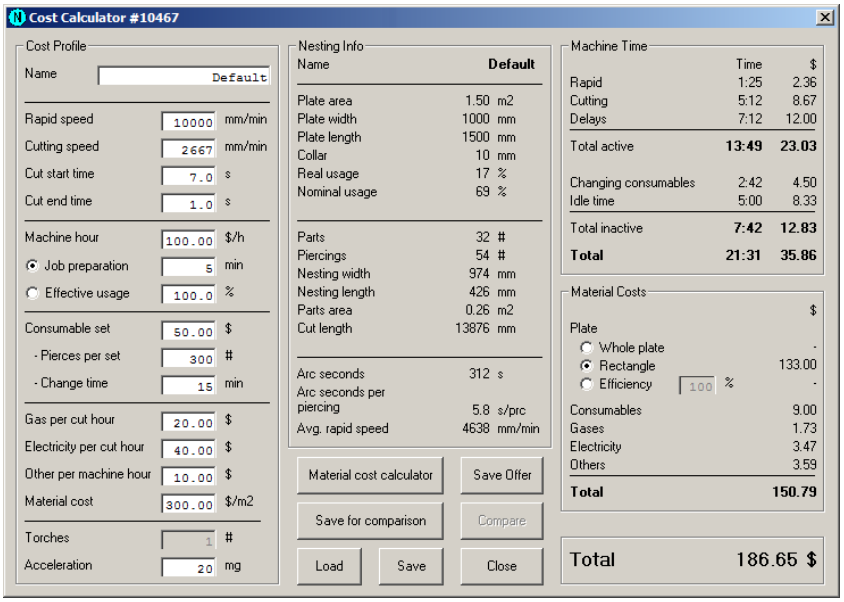
If you have checked the No area calculations option in Handling options there is no data in the fields Area, Parts area, Real usage or Net usage. If you want to know areas, click Calculate area or go to Handling options and uncheck the No area calculations option.

Info

You can type additional info related to the current nesting or part to the Info field. This info is saved to CNC2 files and when you open such files, you can see the written notes. To enable the Info field you must click Edit info. The notes you make won't be stored until you click Save info.

5.3.8 Cost Calculator

Use this tool to approximate the cost to cut a part or a nesting. The calculator gets the nesting data automatically, but you need to provide the cost profile data, such as the cutting speed of the machine. If you want to use your cost profile at a later time, you can save it on your hard drive. You can also compare prices of different nestings. It's amazing how much you can save simply by using the bridge tool only!



DATA:

Cost Profile

Cost profile is a collection of variables that describe how the machine, user or material affects the costs.

- Name Profile name (e.g. “plasma1 iron 0.25 inches”).
- Rapid speed Usually a constant value.
- Cutting speed Dependent on the tool, material (type and thickness) and process.
- Cut start time Time between the torch coming to the piercing point and the start of the cutting movement.
- Cut end time Time between the torch coming to the end of a cut profile and the start of the rapid movement.
- Machine hour The correct value of machine hour cost is essential to get reliable results.
- The cost of machine hour is often priced so that it includes the profit expectations that were set when the machine was purchased. This cost is usually 60-100 $, if the machine is in active use. 60 - 100 $ is also a correct value, if you need to order some of the work from subcontractors.
- If the machine is used only occasionally, you can choose to use just the cost of labor.
- Job preparation The time that the machine stands idle during job preparation. Job preparation time includes not only bringing the plate to the cutting table, setting plate alignment, loading the cutting program, setting the cutting parameters but also those actions taken after the program is cut: collecting the cut parts from the table, cutting scraps off the remnant plate, taking the remnant plate away, etc. This time should be set so that it covers all the time between the moment the cutting table is empty and the moment when the table is empty again - excluding the time when the machine is running a cutting program.
- Effective usage An alternative to the Job preparation. If you know that the job preparation time in your machine is usually half of the machine time, set this to 50%.
- Consumable set The cost of a consumable set.
- Pierces per set How many piercings can be done with a single consumable set.
- Change time The time it takes to change a consumable set.
- Gas per cut hour
- Electricity per cut hour
- Other per machine hour
- Material cost How much does a square foot (or meter) of plate cost.
- Torches Quantity of torches.
- Acceleration Machine acceleration that affects the average rapid speed.

Nesting Info

This data is provided automatically by the software.

- Name Name of the nesting
- Plate area
- Plate width
- Plate length
- Collar A safety zone left by automatic nesting to the edges of a plate.
- Real usage Percentage of the parts area to the plate area.
- Nominal usage Percentage of the nominal area of the parts compared to the plate area or compared to the area of a rectangle, which is drawn around the parts.
- Parts
- Piercings
- Nesting width
- Nesting length
- Parts area
- Cut length
- Arc seconds
- Arc seconds per piercing
- Average rapid speed This is affected by the machine acceleration. If the machine has slow acceleration and/or the average rapid movement is short, then the machine probably never reaches the maximum rapid speed.

Machine time

Shows the active and inactive times along with their costs, calculated from the given data. Active time is the time that it takes to run the cutting program. Inactive time is the time that it takes to prepare a job (like changing the plate) and change the consumables.

Material costs

This frame shows the consumption of material, consumables, gases, etc. and their costs. The material consumption can be handled in several ways:

- You can select the entire plate to be consumed or just the rectangle surrounding the nesting.
- If there is no plate or ready nesting, then you can approximate the material consumption with a probable effective usage.

TOOLS:

Save Offer saves your current price calculation as a simple text file.

Material Cost Calculator Allows you to calculate how much a square foot (or meter) of plate cost. See more in chapter Material Cost Calculator.

Save for Comparison This saves the current cost calculation to the computer memory. You can compare this to later calculations by using the compare tool.

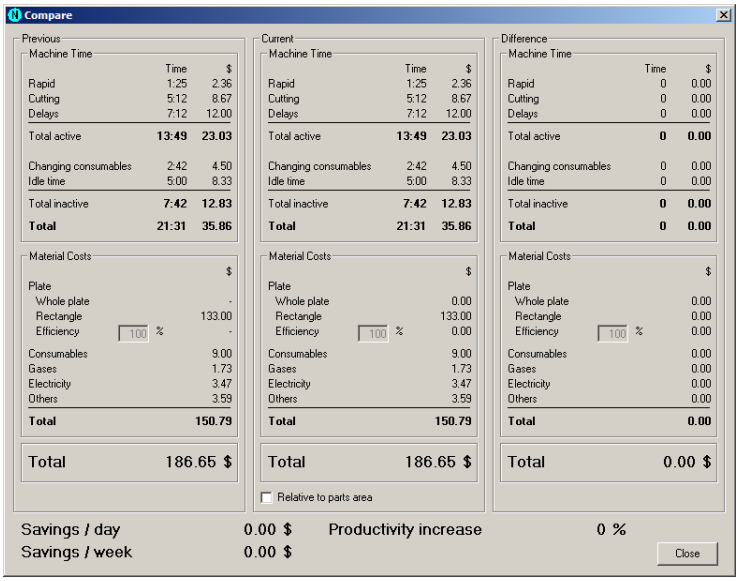
Compare Opens the compare window. See more in chapter Compare.

Load Loads a saved cost profile.

Save Saves the current cost profile.

Close Closes the cost calculator.

5.3.9 Compare

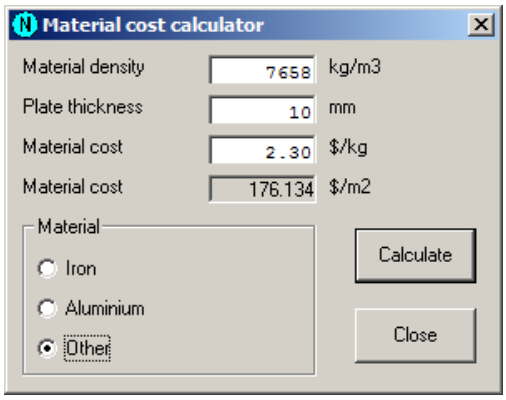


This window compares the costs. The Previous frame shows the results of that cost calculation, which you saved for comparison in Cost Calculator The Current frame shows the latest cost calculation - the one you were looking, when you chose Compare in the Cost Calculator. You can see the difference of these two in the Difference frame.

If you look at the Current frame, you can see that there is a checkbox Relative to parts area. That is because sometimes you can fit more parts to the same plate by nesting the parts better. This kind of situation gives false results, because if you cut more parts out of plate, you will use more time (and money). But when you compare the parts area, you can see that you have less wasted material and thus you have saved more. That's why this option is here. If both nestings have same parts, then this option has no effect to the result.

Savings per day is the sum, how much you save, if you cut this kind of jobs for 8 hours. Savings per week is the same, but for 40 hours. Productivity increase shows how much less time you need to cut this job.

5.3.10 Material Cost Calculator



Use to calculate the price of one square foot (or meter) of your plate. Select first the material from the material frame. If you selected any other material than the Other, then the calculator automatically sets the material density. Set the plate thickness and the material price per pound (or kilogram). Choose Calculate and you are ready.

5.3.11 Nest

This tool activates the automatic nesting process. It nests all the parts in the current nesting to the current plate. If you haven't defined a special nesting area (see Show nesting area), automatic nesting uses the whole plate. You can modify the process by changing the nesting options.

In the following cases part is not nested, but moved to the right side of the plate:

- The part does not fit on the plate or on the nesting area.
- There is at least one open profile in the part.
- If you are using multitorch and the number of copies of the part are not evenly divided between the torches, the remaining (modulo) parts are not nested.

See also MultiNest, Triangle Nest and NestInfo.

5.3.12 Feed Rates

Use this tool to add feed rates (i.e. cutting speeds) to your cutting program. You can set feed rates for individual profiles or elements.

While you are using this tool, you can see several flags with different colors on screen. Each of those flags display what is the feed rate after the flag. The color of the flag indicates the type of feed rate (i.e.: program, profile and element feed rates). Red flags mean error and you shouldn't see them. If you do see a red flag, just reset the feed rate for that element.

Definition of different feed rates:

Program feed rate - The default feed rate for the whole cutting program, if there are no profile or element feed rates set.

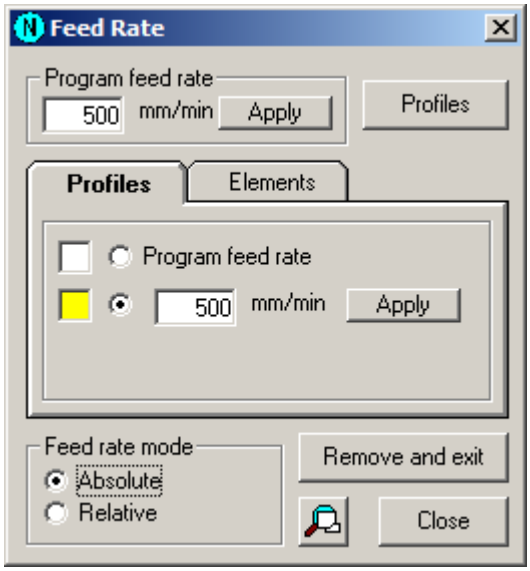
Profile feed rate - The feed rate for a single profile. The whole profile is cut with this feed rate, if there are no element feed rates set. The profile feed rate can be set to program feed rate or custom feed rate.

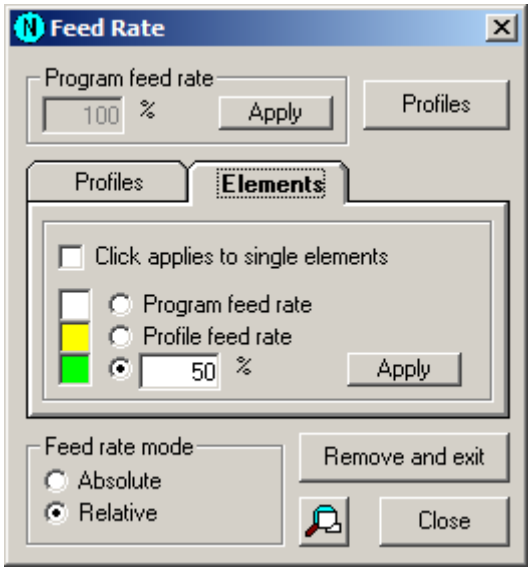
Element feed rate - The feed rate of a single element which can be set to program, profile or custom feed rate.

Feed rate modes:

Absolute - Feed rates are given in millimeters (or inches) per minute.

Relative - Feed rates are given relative (1-100%) to the current cutting feed rate. This type is supported only in ProMotion® iCNC controllers. This would be similar to turning the feed rate override potentiometer of the controller.

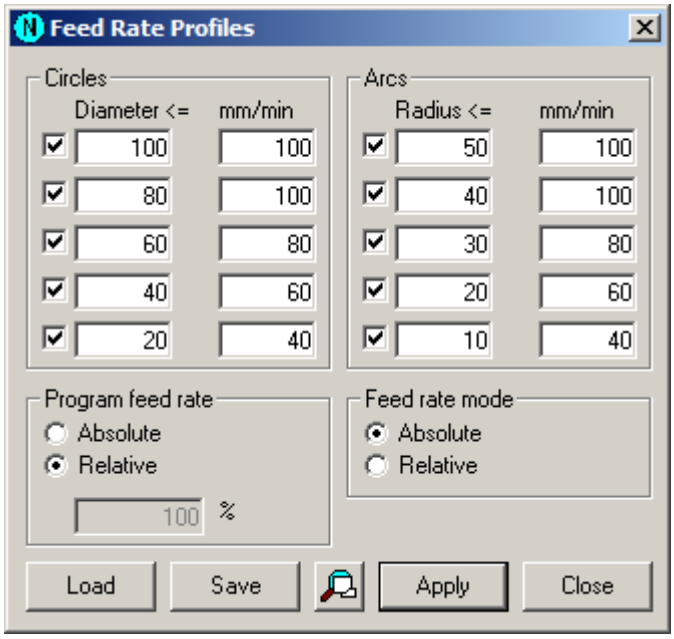




How to use this tool:

- When you start this tool it requests the program feed rate. This feed rate is set to all profiles and elements, which do not have a feed rate. If every element already has a feed rate, then the tool starts immediately.
- To change a program feed rate, insert the new value in the corresponding text field and click Apply.
- When you choose the profiles or elements, their feed rates change. If the Profiles tab in on top then your click changes the feed rate of profiles. It the Elements tab in on top then your click changes the feed rate of elements. Profiles and elements get that feed rate, which is set in the tab.
- You can set the profile feed rate type in the Profiles tab. If you want to use the custom feed rate, type its value in the text field and choose Apply. The feed rate that you select here is set to all profiles which you choose after this. This change has no effect on feed rates which are already set. It is applied only to those profiles that you choose.
- To set the element feed rate type in the Elements tab. If you want to use the custom feed rate, type its value to the text field and choose Apply. The feed rate that you select here is set to all elements which you choose after this. This change has no effect on feed rates which are already set. It is applied only to those elements that you choose.
- If you have checked Click applies to single elements in the Elements tab, then your clicks change the feed rates of single elements. If it is not checked, then you have to click the start and the end element. All the elements between start and end also get the same feed rate.
- If you click an element with the left mouse button, then the whole element is selected. Right click splits the element and the feed rate is set only to the other half. Right click works only, if Click applies to single elements is not checked.
- You can remove all the feed rates by choosing Remove and exit. This also closes this tool.
- You can easily set all feed rates to the whole nesting with the use of Feed rate profiles tool.

5.3.13 Feed Rate Profiles



Feed rate profiles let you set feed rates to all arcs and circles at the same time. You don't need to choose each of them separately.

This is how you use feed rate profiles:

- Start this tool by choosing Profiles in the Feed Rates dialog.
- Select absolute or relative feed rates.
- Set the diameter and the corresponding feed rate values for circles. If you don't need all the diameter + feed rate pairs, you can disable them by un-checking the box at the beginning of the line.
- Set the radius and the corresponding feed rate values for arcs. Disable extra lines.
- Set program feed rate, if you use absolute feed rates.
- Click Apply to set the feed rates according to your given profile. All existing feed rates are removed and the feed rates defined in the profile are applied to the nesting.
- Save the profiles for future use. This is handy when you need different profiles for different tools. Click Save and enter the file name. Click Load to reuse the file.

5.3.14 DiameterPro

NOTE!
DiameterPro requires ProMotion® DiameterPro to work.

5.3.15 Plate Editor

Plate editor is a set of tools which are used to change the shape and position of a plate. Click Plate Editor button to activate the editor. The button stays down until you click it again. A small tool window appears. The tool window contains the plate editor's tools. Click the button again to close the plate editor.

5.3.16 Edit Plate

Use this tool to remove parts out of a plate. Follow these steps:

- Move the mouse cursor over the edge of a plate and click it.
- Move the mouse cursor to the next position and click again. A new line appears from the previous point to this point.
- Continue as above until you reach the edge of the plate. Click the edge and the plate is split into two parts, but only one of them is displayed.
- If the wrong part is displayed, use the Change Split tool to change it.

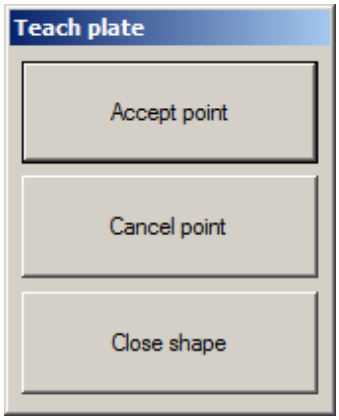
5.3.17 Edit Plate With The Machine Motion

This tool is exactly the same as the Edit Plate tool with the following exceptions.

- Mouse cursor does not respond to the mouse movement. Mouse cursor shows the position of the torch and moves, if the torch moves.
- The plate in the ProMotion® Nest's work window is rotated to the same angle as the real plate. When you stop using this tool, the plate is rotated back to its original angle.
- The Space button works as the left mouse button (the left mouse button works too).
- The Esc button cancels editing. The original plate is displayed and the mouse works normally.
- This tool is usable only with ProMotion iCNC controller.

5.3.18 Teach Plate

Use this tool to teach the shape of the plate. Just drop the plate on the cutting table and then use the laser pointer or the torch to show the edges of the plate.



Follow these steps:

- Place the plate on the cutting table.
- Start this tool. A new window opens (see above).
- Move the laser pointer (or the torch) over the edge of the plate. Then click Accept point.
- Move the laser pointer over the next corner of the plate. Click Accept point again. Repeat this step while you have shown all the corners of the plate.
- Finally click Close shape and your plate is ready.
- If you ever do a mistake while teaching the shape, just click Cancel point to remove the last point.

Hint: You can use this tool to teach new parts for cutting if you convert the plate to a part by using the tool Plate-Part-Plate.

NOTE!
This tool can be used only with a ProMotion iCNC controller.

5.3.19 Set Origin

This tool sets one of the plate corners* to the origin.

- Click one of the corners to set it as a new origin.

* In this case “CORNER” means one end of an element, which is one of those elements that form the plate profile. Thus it is possible that it is not a corner at all.

5.3.20 Show Nesting Area

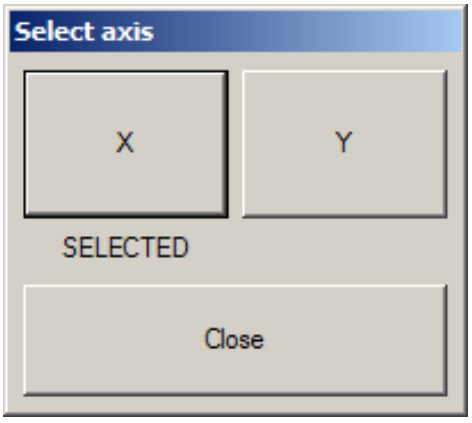
Use this tool to define nesting areas on the plate. Nesting areas are useful with combination of automatic nesting and multitorch tools.

Follow these steps to show nesting area:

- Start Plate editor.
- Select this tool. A red rectangle appears inside the plate. The rectangle is the new nesting area.
- Move the mouse cursor over the edge of the rectangle and press the left mouse button down. The border of the rectangle now follows the movements of the mouse.
- Modify the rectangle as you like and finally close Plate editor to confirm your changes.

5.3.21 Align Parts

Use this tool to align the plate with the X or the Y axis. Why? Automatic nesting performs better if the bottom edge of the plate is aligned with the X or the Y axis.



5.3.22 Change Split

Use this tool to change between parts displayed. See Edit Plate.

5.3.23 Rotate Plate

This tool rotates the current plate 90 degrees counter clockwise.

5.3.24 Mirror Plate

Use this tool to mirror the current plate in Y-axis.

5.3.25 Move to Origin

This tool repositions the current plate. After the plate is repositioned, its minimum X-and Y-coordinates are equal to zero.

5.3.26 Undo Plate Edit

Edit Plate-tool splits a plate into two parts. If you made some errors during editing, use this tool to bring the original plate back

5.3.27 Zooming

The easiest way to zoom in and out is using your mouse wheel. You can use it anytime. If you don't have mouse with a wheel, then you can use Zoom Minus and Zoom Plus buttons. Then the zooming continues until you release the button.

To get back to the normal view i.e. where the whole nesting is visible and as large as possible, just click the Zoom 100% button.

5.3.28 Pan View

You can pan the view by moving the mouse cursor over the work window while pressing the left mouse button. The picture will follow the mouse movement until you release the left mouse button.

5.3.29 Undo

Use this tool to cancel the last action.

5.3.30 Trash

Closes the current nesting which is seen in the work window. If there are more than one nesting open, the next one will be displayed in the work window.

5.4 File Menu

The File menu is used to open existing files, save new files and exit the application. Here is a list of all items in the File menu.

Item Action

ITEM	ACTTION
New	Create a new blank plate.
Open	Open an existing file
Trash	Close current nesting.
Save As	Save current nesting.
Macro	Create a new shape with macros
Print	Print the current nesting
ESSI/EIA Raw Import	Imports ESSI and EIA files as they are
DNC	Download from DNC
Import	Import nesting from ProMotion® Cut
Export	Export nesting to ProMotion® Cut
Exit	Exit ProMotin® Nest application

NOTE!
Some of these tools were already explained in the Toolbar chapter. Those tools are not repeated in this chapter.

5.4.1 Save As

Saves the current nesting (the one in the work window) in the chosen format. Possible formats are ESSI, EIA, DXF, ROBOTIC CNC and CNC-2. For more information about ESSI and EIA see ESSI Options and EIA Options.

In the demo version of ProMotion® Nest no saving is possible.

It is also possible to save point marking programs. This is an optional module. See more at topic Point Marking.

NOTE!
ProMotion® Nest cannot read ROBOTIC CNC. If you want to edit your cutting programs later, then the best format is CNC-2.

5.4.2 Print

This tool prints the current nesting to the default printer.

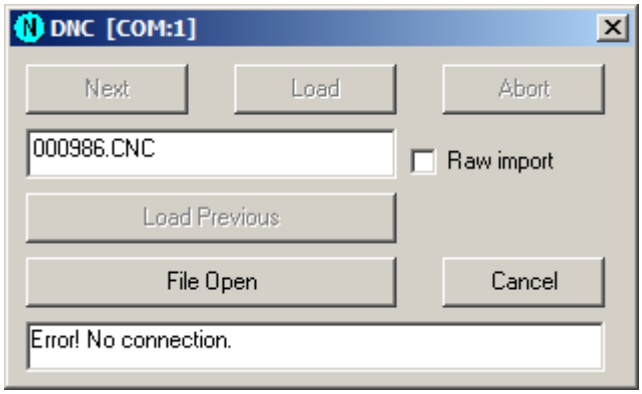
5.4.3 ESSI/EIA Raw Import

Use this tool to load ESSI and EIA files to ProMotion® Nest when you have a cutting program that is ready to be sent to cutting without editing.

Basically this is just like the normal file open. This tool uses the same ESSI and EIA options than the file open does. Where it differs from the normal file open is that keeps things simple. It does not try to reason which shapes are holes or where the leadins or anything else is. Raw import just reads the file in as it is. This way you can utilize any kind of cutting program which is not otherwise supported by the logic of ProMotion® Nest (i.e.: common cutting and programmed stops).

5.4.4 DNC

Use this tool to load files from DNC connection. ProMotion® iLink must be running on the PC you are downloading the files from.



Next Allows the user to browse the files available in ProMotion® iLink working directory (folder). Available filenames are displayed in the text field just below this button.

Load Allows the user to start DNC download. The file currently displayed in the text field starts loading. You can just type the file name into the text field and choose Load.

Abort Allows the user to abort DNC download

Load Previous Allows the user to utilize the last file again without downloading.

File Open Allows user to change to normal File Open dialog. Use this to locate a file in the controllers' hard drive or on the network that is accessible.

5.4.5 Import

This tool imports a nesting created by ProMotion®Cut.

5.4.6 Export

This tool exports the current nesting to ProMotion® Cut. Please note that the exported nesting won't open automatically in ProMotion® Cut. To open it, you must use the import tool of ProMotion® Cut.

5.4.7 Exit

This tool closes the ProMotion® Nest software.

Important! All nestings will be closed and all data they contain will be lost upon exiting. If you want to save one or more of those nestings, you should save them before exiting.

5.5 View Menu

In View menu you can change the appearance of ProMotion® Nest and the way how it draws your nestings.

Black and White view

This option turns drawing color to black.

Outbits

If this option is checked, then ProMotion® Nest displays special outbits, if there are any in the nesting. For more info see the ProMotion® Cut manual.

Transferlines

- Hide All Transferlines can be toggled on or off by selecting this option.
- Show Cut When selected, you can see transferlines between cutting profiles. This is the default setting.
- Show Line Marking When selected, you can see transferlines between line marking profiles.
- Show Point Marking When selected, you can see transferlines between point marking points.

Show Large Buttons

This option turns all buttons in ProMotion® Nest toolbar and toolboxes to large ones. This setting is recommended for touch screen use.

NOTE!
You need to restart ProMotion® Nest to have this change take effect.

5.6 Tools Menu

Tools menu contains tools to manipulate nestings. You can fix parts, add marking, nest manually or automatically, set cutting order, add bridges and do many other things. The tools are organized in an order where they are usually used. For example you should do automatic nesting before you add bridges.

NOTE!
Some tools are not part of the standard ProMotion® Nest, but they are options that may be bought separately. Depending on the options in your license some tools may not be available.

NOTE!
Some tools of this menu were already explained in the Toolbar chapter. Those tools are not repeated here

5.5.1 Remove

The left mouse button activates area deletion. Keep the left mouse button pressed down and move the mouse. A rectangle will follow the movement of the mouse. When you release the left mouse button, all the profiles that are completely inside the rectangle will be deleted. If you click the right mouse button, only a single element or a transferline point will be deleted.

5.5.2 Copy

This tool allows user to copy different objects to the clipboard from where she/he can paste them to any nesting. The object that is to be copied can be chosen from the “Options” menu. There are two kinds of objects that can be copied: shapes and nestings. An object can be copied by moving the mouse cursor over the part and clicking the left mouse button.

5.5.3 Cut

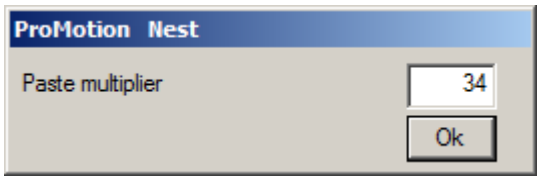
Use “Cut” to move shapes to the clipboard. You can paste shapes from the clipboard to nestings.

Follow these steps:

1. Activate the “Cut” tool by choosing “Cut” (see the picture above).
2. Press the left mouse button and keep it down. A focus rectangle appears.
3. Surround the shapes you want to cut with the focus rectangle and release the left mouse button.

5.5.4 Paste

Use this tool to paste the copied/cut objects to a nesting. When you choose a dialog window appears (see below). If you want more than one copy, change the paste multiplier in the dialog window. The paste multiplier tells how many times the copied objects are to be pasted. Click on the editing area and the objects are pasted.



5.5.5 Edit

Move Shape

Use this tool to manually change the position of a shape. Move the cursor over a shape and press the left mouse button down. Now the shape will follow the movement of the mouse until you release the button.

This tool also activates Collision Tools

Colliding means that you move a shape as close to another as possible. ProMotion® Nest provides collision tools for this purpose. To collide a shape you should first move the shape close to its final position and then use the appropriate collision tool. There are four tools for colliding shapes: up, down, right or left.

There is a button in the middle of collision tools (buttons). Pressing this button will cause the shapes to appear in a different color if they do not have enough space between them. Releasing the button allows the parts to revert to their normal color.

So, how great should the distance be between two shapes? In the Nesting Options check the kerf width and clearance parameters. The distance between two shapes should be twice the kerf width and once the clearance. This formula is used by the colliding tools and overlap checking.

NOTE!
Collision tools are visible only when the Move Shape tool is active.

5.5.6 Rotate Shape

Allows the user to rotate a shape simply by grabbing it with a mouse. The part will follow the mouse movement (rotate).

The rotation steps can be set in Handling Options. Recommended steps are 5 or less degrees.

5.5.7 Mirror

This tool allows you to mirror shapes in X or Y axis. If you move the mouse cursor over a shape and click the left mouse button, the shape will be mirrored in Y axis. If you click the right mouse button, the shape will be mirrored in X axis.

5.5.8 Change Piercing Point

There are two ways to change the current piercing point. To change the pierce point to the first point of the element, move the mouse cursor over the element and click the left mouse button. If you want to choose any point on the element, move the mouse cursor to the desired start point and click the right mouse button. This tool can only be used on complete profiles.

5.5.9 Change Compensation Side

Change the compensation side by moving the mouse cursor over the element and clicking the left button.

5.5.10 Change Cutting Direction

Change the cutting direction by moving the mouse cursor over the element and clicking the left button.

5.5.11 Split Element

An element can be split in two by moving the mouse cursor to the desired split point and clicking the left mouse button.

5.5.12 Join Profiles

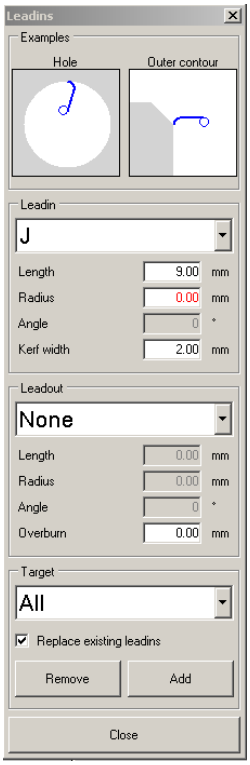
Use this tool to close an open profile or join two or more open profiles.

Follow these steps:

- Hold down the left mouse button.
- Drag a rectangle around start/end points of open profile(s).
- Release the mouse button.

5.5.13 Leadins

By using this tool you can add, remove and modify leadins and leadouts. When the Leadins tool is active, the dialog window below is visible. Use that window to change the parameters of the leadins and leadouts. If a value is shown red the lead in cannot be created (picture showing too small radius).



Leadin and Leadout types:	
Nothing	No leadin or leadout. This type has a special purpose, if you generate CNC code for old ProMotion controllers. If there is no leadin, then the controller adds one.
Straight	A straight line which has the same direction as the first (or the last) element of a profile.
90 degrees	A straight line which is on 90 degrees angle (on the kerf side) compared to the first (or the last) element of a profile.
Arc	An arc which has a 90 degrees central angle. Connects the first (or the last) element of a profile tangentially.
0-179 degrees	A straight line which is on 1 to 179 degrees angle (on the kerf side) compared to the first (or the last) element of a profile.
J	A leadin that contains a straight and an arc. Straight section always points to the center of the hole. Restirctions are arc radius cannot be smaller than ½ of kerf, length needs to be bigger than arc radius.
Semi circle	A half circle. Connects the first (or the last) element of a profile tangentially.
Custom	This is a user defined type read from a file. ESSI- and EIA-programs often has this kind of leadins (or leadouts). You cannot add this kind of leadins.

Leadin / Leadout selection:

To add, remove or modify leadins, click on the pierce point or select “Target”, check box “Replace existing leadins” and click “Add”.

Length:

Length of the leadin (straights).

Radius:

Radius of the leadin (arcs).

Angle:

Angle of the leadin (Free angle).

Kerf:

Selected process kerf.

Overburn length:

Overburn means that when the machine has cut around a profile, it starts to cut the profile again (it goes for a next round) and cuts it some length. That length is defined here. Just enter the value to the text box and click at the pierce point or select target and click “Add”.

Target:

Select the type of profiles where you you want to modify leadins/outs.

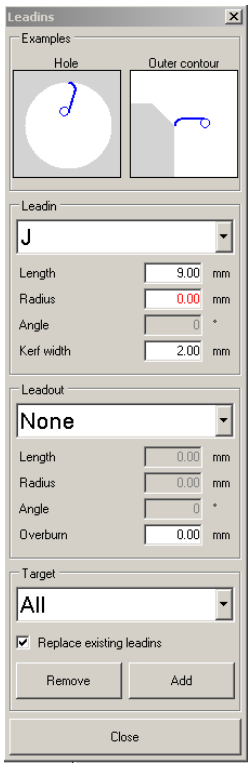
Replace existing leadins:

Check this option, if you want to change existing leadins or leadouts. Otherwise you can only add new leadins (or leadouts) to profiles, which has no leadins (or leadouts).

Examples:

How to add a leadin/out:

1. Choose the type of leadin you want. Set Length, Radius etc.
2. Choose the type of leadout you want. Set Length, Radius, Overburn etc.



3. Click the profile where you want to add a leadin.

How to change a leadin into another:

Repeat steps 1-2 above.

3. Check the “REPLACE EXISTING LEADINS” box.
4. Click the profile that has the leadin you want to change.

How to add a leadin and leadout to a profile:

1. Check the “LEADIN” box.
2. Choose the type of leadin you want.
3. Check the “LEADOUT” box.
4. Choose the type of leadout you want.
5. Click the profile to add the leadin and leadout.

How to change all leadins and leadouts of Hole profiles:

Repeat steps 1-4 above.

5. Check the “ REPLACE EXISTING LEADINS “ box.
7. Select “HOLE PROFILES”
8. Choose “ADD”.

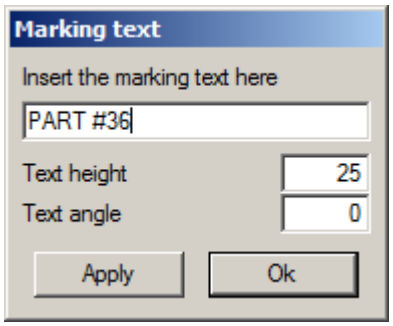
How to remove all leadouts:

1. Set leadin to “None”.
2. Set leadout to “None”.
3. Select target “ALL PROFILES”
4. Click “ADD”.

5.7 Marking

5.7.1 Marking Text

With this tool you can insert text on plates for marking. Selecting this tool activates the window below:



To Insert text for marking:

1. Write the text you wish to mark into the field Insert the marking text here.
2. Set the text height. The minimum allowed height is 5 mm (0.2 inches).
3. Set the text angle (0-360 degrees).
4. Click Apply to confirm the changes.
5. Click the part you want to mark. The text is inserted to the spot you clicked.

NOTE!
This is an additional module and it is not included in the basic version of ProMotion® Nest.

5.7.2. Hole to Point

This tool converts round holes to point marking points. You only need to click those holes you want to convert.

NOTE!
You cannot reverse the conversion. If you make a mistake, please use Undo tool.

5.7.3. Cut to Line Marking

This tool converts holes to line marking profiles. You only need to click those holes you want to convert.

NOTE!
You cannot reverse the conversion. If you make a mistake, please use Undo tool.

5.8 Autonest

5.8.1 Triangle Nest

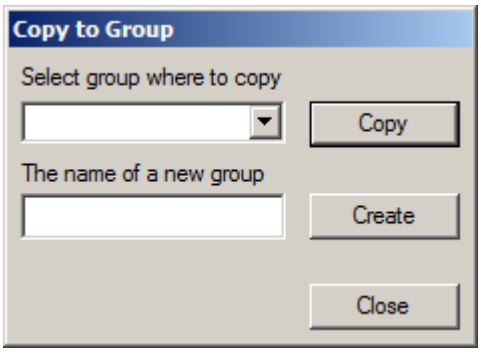
This tool nests the parts into the smallest possible rectangle. For example two triangles are nested so that their sides are facing each other. This tool works well with triangles and that's where the name comes.

5.8.2 MultiNest

MultiNest nests all shapes automatically. If shapes do not fit on the current plate, MultiNest creates new copies of the current plate and continues nesting on them until all the shapes are nested.

5.8.3 Groups

This tool allows you to copy shapes to nesting groups. Nesting group is a group of parts, which all move and autonest together like a single shape. When this tool is active the dialog below is visible.



When this tool is active, you can select (and unselect) shapes by clicking on them or drawing a rectangle around them.

The list Select group where to copy shows all possible groups where you can copy shapes. Actually this list contains all geometries from the geometry window and you can later turn them to groups (see example below).

Copy button copies all the selected shapes to the group selected from the list.

If you want to create a new group, write its name to the field and choose Create. Now you can see the new group in the list and in the geometry list window.

When you have copied all the shapes you want from this nesting, choose Close.

Please note that all other tools are disabled while this tool is active.

How to create a nesting group:

- Activate Groups tool.
- Create a new group (type its name to the text field labeled. “The name of a new group” and choose Create).
- Select the group you just created from the list Select group where to copy.
- Select the shapes you want add to your group (click all of them).
- Choose Copy.
- Close groups tool and activate your group from the geometry list (left click the name of your group in the list).
- Right click the geometry list and select Toggle Group On/Off from the pop-up dialog box. Now you can see an asterisk in front of the geometry name. This means that this geometry is actually a group.
- Now you can manually move and rotate the parts in your group. Move them close to each other.
- When your group is ready, right click the geometry list again and this time select Copy to Nesting. Enter the number of groups you want to nest and finally you have groups in your nesting!

5.8.4 Freeze

Use this tool to freeze parts for the duration of the automatic nesting process. Frozen parts do not change their position during automatic nesting process.

- Click the part you want to freeze. You will now see the parts highlighted in bright blue.
- To freeze multiple parts, draw a rectangle around the desired parts.
- To unfreeze a part, click it again.

NOTE!
Automatic nesting cannot nest inside holes of frozen parts. If you want to nest to those holes, you should do it manually and then freeze the parts inside of them too.

5.8.5 AutoFill

This tool fills the remaining area of the plate with the copied shapes. ProMotion® Nest nests all shapes automatically to get optimal fill. The nesting options affect to the performance of this tool.

Follow these steps to fill a sheet:

1. Copy a shape by using the Copy tool.
2. Click the AutoFill button .

5.9 Cutting

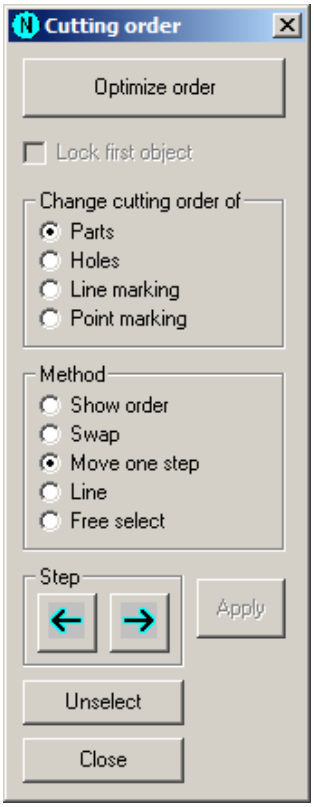
5.9.1. Optimize Cutting Order

Use this tool to let ProMotion® Nest to make cutting order for you. ProMotion® Nest will calculate the optimum cutting order so that parts are always cut near the edge of the plate. Please note that when a part is cut off the plate it leaves a hole, which is now the edge. The idea is to prevent the heat to bend the plate.

If you are not happy with the result, you can easily change the cutting order using the Change Cutting Order tool.

5.9.2 Change Cutting Order

When this tool is activated, the following dialog will appear:



You can let ProMotion® Nest to do the cutting order for you by clicking the Optimize order button. See more details at Optimize Cutting Order. You can also do the cutting order yourself by using this tool.

The cutting order can be changed between Parts (shapes), Holes, Line Marking Profiles and Point Marking points.

There are five methods which can be used to change the cutting order: Show Order, Swap, Move One Step, Line and Free Select.

In the Show Order method you just click the objects in that order they are about to be cut or marked. When you click an object, it will change its color to indicate that it is selected. If the color of the object will not change, then you cannot change its order (it's probably the wrong type). Selections can be removed by clicking the Unselect button. The option Lock First Object can be used with this method. If it is selected, then you cannot change the cutting order of the objects which are before the first selected object in the cutting order. When you are ready, choose Apply to create the new cutting order. This is the only method that you can use on line and point markings.

In the Swap method you choose two objects and their positions in the cutting order will be changed between them. When you click the first object, it will change color to indicate selection. When you click the second object, the first object will become unselected and the cutting order will change.

In the Move One Step method you just choose the object, which cutting order you want to change, and then use the Step arrows to change the cutting order. If you click the left step arrow, the selected object will be cut earlier and if you click the right arrow, it will be cut later.

In the Line method you draw a line over the parts or holes whose order you want to change. The cutting order of the first part/hole that the line overlaps won't change. The rest of the overlapped parts/holes will come immediately after the first one.

In the Free select method you just click the profiles in the order you want to cut them and then choose apply. This method is named free select, because you can select any cutting order between parts and holes (e.g. you can first cut all the holes in your nesting and then all the parts). This method may disarrange the internal data structures of ProMotion® Nest, which may cause automatic nesting and some other tools to fail. You should only use this method if you can't set the cutting order with the other methods. If you decide to use this method, use this when you have done everything else for your nesting.

Apply button is used in combination with the Show order and the Free select methods. Unselect button removes all selections.

Close button closes the dialog.

5.9.3 Bridge

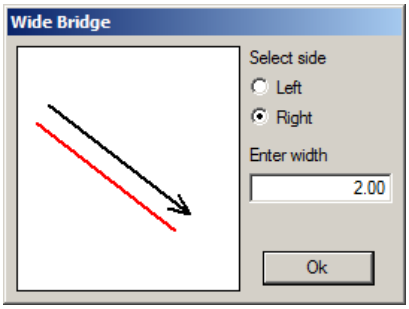
With this tool it is possible to create a bridge between two or more complete shapes. Bridge is a two-way line which unites two shapes. Bridge can be created by pressing the left mouse button down and moving the cursor over all the shapes which will be bridged. A "RUBBER BAND" will follow the mouse movement and shows the location of the future bridge. When the left button is released, the bridge will be created.

If Vertical-Horizontal Bridging option is chosen from Handling Options, then all the bridges will be either vertical or horizontal. If the "RUBBER BAND " is more horizontal than vertical, then the bridge will be horizontal. Otherwise it will be vertical. The Y-coordinate of the horizontal bridge is the same as the Y-coordinate of the starting point of the "RUBBER BAND ". Likewise the X-coordinate of the vertical bridge matches the X-coordinate of the starting point of the "RUBBER BAND ".

NOTE!
Leadin and leadout of the first shape will be copied to the final shape.
Possible leadins and leadouts of the other shapes are removed.

Wide Bridge

Wide bridge is like a normal bridge above, but it leaves a solid area between two profiles. You can create wide bridges just like normal bridges. The only exception is that when you release the mouse button the window below appears.



- The black line represents the line you just drew. It is also the other side of the bridge. The red line is the other side. The wide bridge will be created between these lines.
- Select the side of the red line: left or right.
- Enter the width of the bridge. If you enter a width that is less than 0.1 mm (0.004 inches), a normal bridge is created instead of a wide one.
- Click "OK".

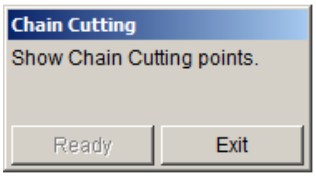
Activate Wide Bridge feature in handling options.

5.9.4 Chain Cutting

This tool is used to chain profiles together. This way you can cut several profiles with a single piercing.

Follow these steps:

- Click the point where you want the chain to begin. Now a “RUBBER BAND” follows your mouse movement and shows the route of the chain.
- Move the mouse cursor to the next point you want the chain to go and click again.
- When you click a profile, it is added to the chain.
- Continue these steps until your chain is ready. Choose “READY” on the chain cutting dialog (see picture below).



- The chain is ready. If you want create a new chain, repeat the procedure above.

Special cases:

- If the profile has a leadin or leadout, the chain automatically goes to the beginning of the leadin and continues from the end of the leadout.
- If the profile is not closed, the chain automatically goes to the beginning of the profile and continues from the end of it.

5.9.5 Add Transferline Point

A new transferline point can be added by clicking the left mouse button. The new transferline point will be the last in the cutting order. The cutting order can be changed by the Change Cutting Order tool.

5.9.6 Scrap Cutting

Use this tool to create scrap cutting lines to your nesting. Scrap cutting lines are used to cut the scrap out of the plate, when the cutting program is completed. Use this tool only on ready nestings.

Do this:

- Click the point where you want to start your scrap cutting line. This point should be outside of the plate or inside of a part.
- Now a “RUBBER BAND” follows your mouse.
- Click the next point of the scrap cutting line. If that point is outside of a part and inside of the plate, it will become a waypoint. That means that the scrap cutting line goes through this point. If the point is inside of another part or outside of the plate, the scrap cutting line ends at the boundary of the part or the plate.

A margin is left to the beginning and to the end of the scrap cutting line. These margins can be set in the Handling options.

Hint: When crossing the plate’s edge do it by drawing the scrap cutting line from part’s edge to the plate’s edge. This way you don’t have to be that exact when setting the plate’s edge.

5.10 Special Tools

Special Tools are tools which are not needed by every user of this software but can be utilized in special cases.

5.10.1 Point Marking

Use this tool to select which holes will be point marked. This tool is part of an optional point marking module.

Follow these steps to select holes for point marking:

1. Hold the left mouse button down and drag a rectangle around all the holes you want to mark.
2. Release the left mouse button and all holes which are inside the rectangle turn to black. They are selected for marking.
3. When you have selected all the holes you want to mark, save the point marking program by using the “Save As -> Point” tool.

If you accidentally selected a wrong hole, you can unselect it by drawing a new rectangle around it.

If you want to (un)select just one hole, you can just left click it.

NOTE!
This tool works only for single shapes - not for entire nesting.

NOTE!
This is an additional module and it’s not included in the basic version of ProMotion® Nest.

5.10.2. Coating Lines

If your machine has a welding torch, you can coat shapes easily with this tool.

Follow these steps:

1. Set the distance between lines and other settings in Special Tool Options.
2. Activate this tool from the menu Actions->Special Tools->Coating Lines.
3. Hold the left mouse button down and drag a rectangle around those shapes you want to coat.
4. Release the mouse button and all the selected shapes are filled with black horizontal lines - coating lines.

ProMotion® Nest saves the coating lines as line marking lines. You should configure your machine so that the welding torch replaces the line marker. Alternatively, if your ProMotion® Nest has ESSI/EIA saving option, you can redefine the line marking code sequences to correspond the welding torch control commands.

5.10.3. Machining Allowance

Machining Allowance is an additional area left on cut pieces to be processed by a machining tool. When activated, the program displays a window with a short description of how to use this tool. More important, the window contains a setting needed to set machining tolerance on profiles.

A profile is pointed with the mouse cursor and by clicking the right mouse button the machining tolerance will be added to the whole profile. If the tolerance is needed only for a part of the profile, the tolerance is set with two clicks of the left button: first click the point where the tolerance should start and again where the tolerance should end.

The machining tolerance variable is set in the Machining Allowance dialog window. Enter the width of the tolerance into the edit box and click Ok. The dialog window will disappear and the given width is in effect.

You can activate this tool also by pressing Control and “A” simultaneously.

5.10.4. Offset

This tool calculates the real cutting path, when kerf compensation is added. This is an advantage, if your controller can't do it properly or it takes too much time.

Kerf compensation's value is half of the kerf width set in Nesting Options.

NOTE!
This is an additional module and it's not included in the basic version of ProMotion® Nest.

5.10.5. Anchor

Use this tool to anchor the part on plate during cutting. This is done by creating small gaps on the cutting profile so the cutting is ceased on these gaps. The length of the gaps can be set in the tools.ini (see ini files).

5.10.5. Common Cut

Common Cut tool let's you join two parts in a way that their common section (line) is cut with a single cut. This can save a lot of time if the cutting speed is low.

Follow these steps:

- Move two parts close to each other.
- Select this tool.
- Move mouse pointer inside one of the parts and press left mouse button.
- Move mouse pointer inside the other part while pressing the left mouse button.
- Release the mouse button and the parts will be merged.

NOTE!
The correct kerf must be set in the Nesting Options before the use of this tool.

5.10.7. Drill Select

Adds a special tool selection code for a point marking (drill) point. Select the tool from the menu that pops up when you right-click the screen. When this tool is active you can see small flags on each point marking point. The flags show the currently selected tool.

5.10.8. Plate-Part-Plate

This tool simply converts a plate to a part and vice versa.

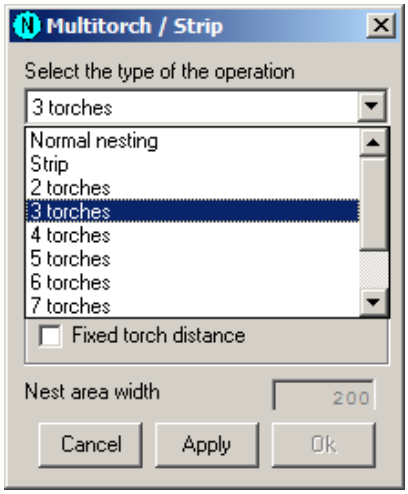
Exceptions: Conversion does not work if...

- There are any parts on the plate.
- There are multiple parts on screen.

5.10.9. Single/Multitorch settings

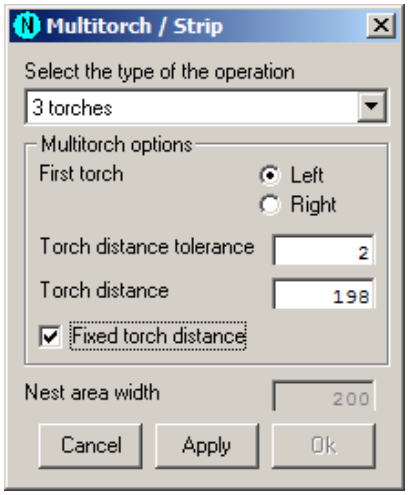
Select the type of the operation from the following list:

- Normal nesting Removes all multitorch data from the plate and it becomes a normal plate again.
- Strip There is only one torch, but the automatic nesting process uses only a narrow strip instead of the whole plate. The strip's width is given to the textbox Nest area width. It is also possible to show nesting area with Show nesting area tool.
- n torches You can set the maximum number of torches in Handling options. This operation divides the plate into n parts of equal size and divides the shapes of the current nesting between them. Only those shapes which the first torch will cut are displayed normally and the rest are displayed as shadows.



Multitorch options:

- First torch Sets the first torch on left or right.
- Torch distance tolerance The maximum error allowed in distance between two torches and also in distance measured from the first torch.
- Torch distance The distance between two torches. The system calculates this for you, if you haven't chosen the fixed torch distance.
- Fixed torch distance If you want to set the torch distance by yourself, check this option. This way you can define narrow nesting areas.



Nest area width:

Nest area is the area (per torch)which is left when the plate collar, the torch distance tolerance and the nesting clearance has been taken out of it. The nest area should be wide enough for the parts to be nested. Minimum width for the nest area is the part's width plus two times the kerf width.

Finally:

When you have selected the type of the operation and set all the necessary options, choose Apply and then Ok.

Important:

Nesting options Clearance and Collar are used during the torch distance calculations. Thus you should set them before you set any of the multitorch settings.

5.10.10 Pick Part

Use this tool to pick any part from a nesting. The picked part will be copied to its own nesting and then moved to the origin.

When you have activated this tool, just click the part that you want to pick.

5.10.11. Show Parts

Lists the names of all parts in the current nesting. Even if there are several copies of a part, its name is listed only once. Click a name in the list and all parts of that name will be colored in the work window.

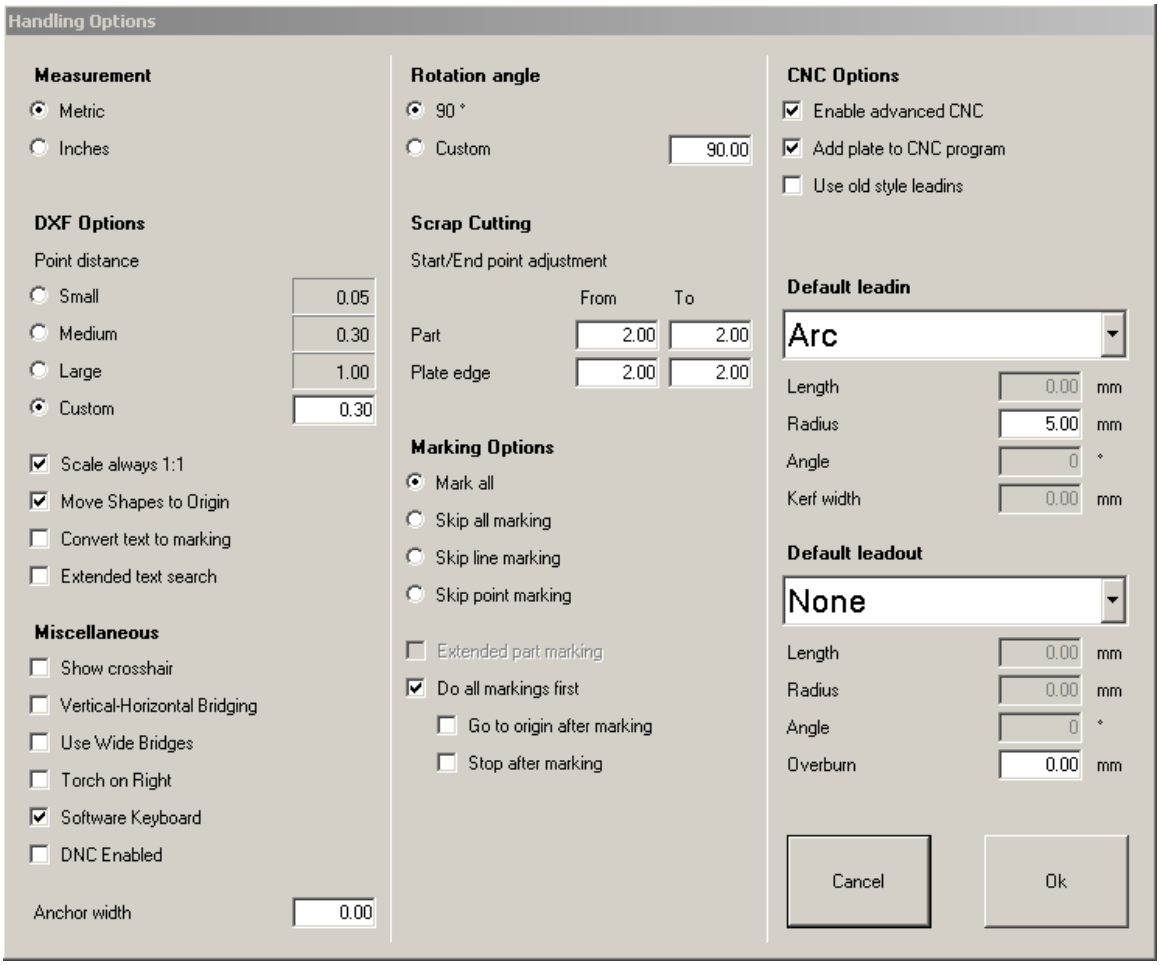
5.11 Ruler

Use this tool to measure distances in your nesting. Press the left mouse button where you want to start the measuring. Then move the mouse and keep the mouse button pressed. On top right corner is a yellow label where you can see the distance from the start point to the current mouse location.

5.12 Options Menu

The Options menu provides tools to configure the ProMotion® Nest software.

5.12.1 Handling Options



Measurement

Measurement is either in millimeters or inches. This option defines which.

DXF Options

- Point Distance If two points are this close to each other, then they are assumed to be the same point. Important! Note: Change the point distance before loading a file.
- Scale always 1:1 When reading DXF files ProMotion® Nest tries to detect which measurement is used in the file. This detection is ignored, if Scale always 1:1 is checked. Then the DXF file is read in millimeters or inches depending on the measurement setting.
- Move Shapes to Origin If this option is selected, then the shape in DXF file is moved so that its minimum coordinates are at 0,0 point. If the DXF file contains a nesting (more than one shape), then the nesting is moved so that its minimum coordinates are at 0,0 point. All the shapes in the nesting are moved exactly the same distance, so their relative position to each other does not change.
- Convert text to marking If this option is checked, ProMotion® Nest converts DXF text entities (TEXT and MTEXT) to marking lines. Those marking lines form the same text that was in the DXF file. Note: This option is part of the marking text module. Marking text module is an optional module and it's not part of the basic module.
- Extended text search Usually ProMotion® Nest searches the text entities at the same region (of DXF file), where the other entities are located. If you check this option ProMotion® Nest searches text entities from the beginning of the file to the end of the file.

CNC options

- Enable advanced CNC Some new features have been added to the Robotic CNC language. Old versions of WinRobo and Pro3Nest softwares do not support these new features. If you are making code to WinRobo older than version 7.5.2 or to Pro3Nest older than version 7.0.9, then do not check this option. Note: Export always uses the most advanced version. This setting applies only to Save As CNC.
- Add plate to CNC program When saving in Robotic CNC, this option saves the plate with all the geometries.
- Use old style leadins This option supports older versions of Robotic and ProMotion Controllers. When saving in Robotic CNC and if there are no leadins or leadouts given for a shape, this option adds a special leadin code that the controller recognizes. The controller has its own leadin settings which apply in cases like this. Note: Export always uses the leadins that you can see on screen. This setting applies only to Save As CNC.

Rotation Angle

Defines the rotation angle, that the Rotate tool uses. The angle is in degrees. Recommended setting is Custom: 5 degrees.

Scrap Cutting

These values define the distance between the scrap cutting line piercing/end point and the edge of part/plate. In the “FROM” field a negative number means that the scrap cutting starts before the edge (e.g. outside of the plate or inside of a part). In the ‘TO’ field a negative number means that the scrap cutting stops before the edge (e.g. inside of the plate or outside of a part). Suggested values are: From Part >= kerf width, To Part <= negative kerf width, From Plate edge = 0 (if the plate edge is set correctly else < 0) and To Plate edge > 0.

Default Leadins

In this section you can define what kind of leadins and leadouts are automatically added to all profiles when loading DXF or creating macros. If you load EIA or ESSI files, no leadins or leadouts are added, because they usually have programmed leadins and leadouts.

Marking Options

These settings affect how and which markings are saved to a CNC file and then eventually marked.

- If Mark all is selected then both line markings and point markings are saved.
- If Skip all marking is selected, then none of the markings are saved. This is a useful option if you just want to print the part names (on paper), but not really mark them.
- If Skip line marking is selected, then only point markings are saved.
- If Skip point marking is selected, then only line markings are saved.
- If Extended part marking is checked, then the Line marking start block (please see Code Sequences) is saved just before every line marking and the end block is saved right after every line marking. This applies to point markings as well. This option is disabled, if you have Do all markings first option checked.
- If Do all markings first is checked, then all the markings are saved first and after them the parts to be cut. Go to origin after marking moves the machine to the zero point of the plate, when all the markings are done. If Stop after marking is checked, then the machine stops after markings.

Miscellaneous Options

- Show Crosshair If this box is checked, a crosshair will be drawn at the current cursor position.
- Vertical-Horizontal Bridging If this box is checked, bridging is done vertically or horizontally. See Bridge tool for further information.
- Use Wide Bridges This is an option for bridging tool. If this option is selected, a solid area is left between bridged profiles so they will stay together when cut from the plate. See Bridge tool for more information.
- Torch on right Changes the origin point from the bottom left corner to the bottom right corner.
- Software keyboard If you don’t have a keyboard, you can always use the software keyboard for text input. If you set this option, then the software keyboard is automatically displayed when text input is needed. Please note that you can use the mouse wheel for numerical input in ProMotion® Nest
- DNC enabled This option sets the default download behavior of ProMotion® Nest , when requested from ProMotion® Cut. If this option is set, then DNC download automatically activates when you click DOWNLOAD in ProMotion® Cut. See more info about DNC in chapter File Menu.

5.12.2. Special Tool Options

These are options for special tools.

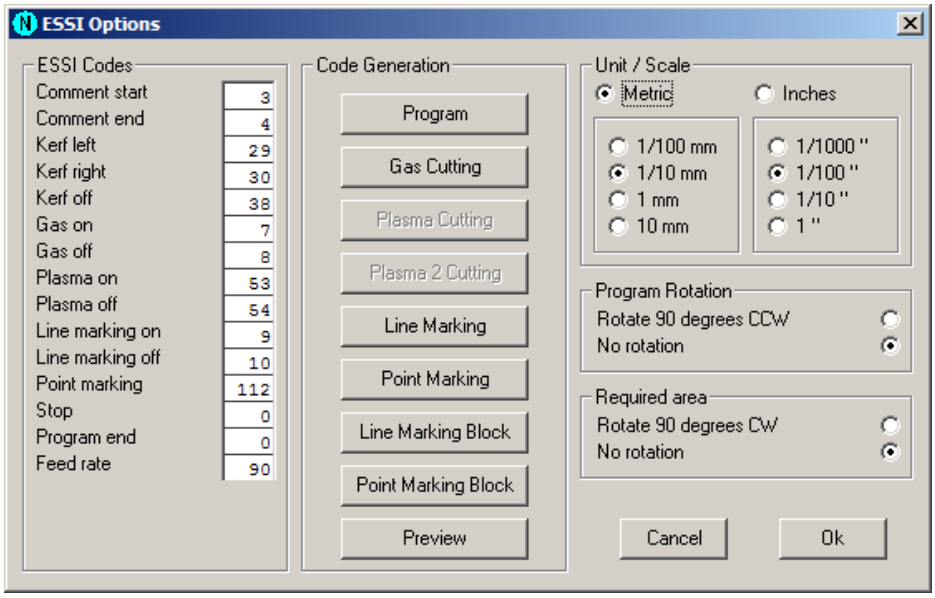
Coating Lines

Distance between lines is the distance between two coating lines.

Leadin / Leadout is the measure how much the coating lines will be drawn over the edges of a shape.

Minimum Gap is the smallest width of a hole that is not jumped over when the coating lines are drawn.

5.13 ESSI Options



These options are used when reading and writing ESSI files.

Essi Codes

ESSI files are interpreted according to these codes. These codes should match the codes used in the ESSI file.

Program Rotation

If the rotation is selected, all the new nestings which are read from ESSI files will be rotated 90 degrees counter clockwise.

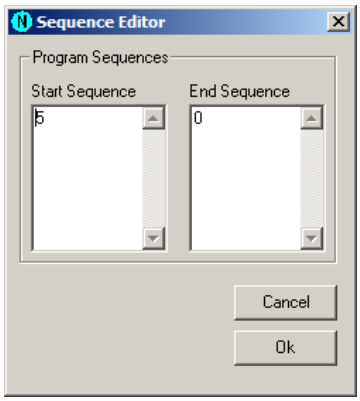
Unit / Scale

These options set the default units and scale used in ESSI files.

Code Generation

Use these commands to define start and end sequences of different actions. These sequences are used in writing ESSI files. See Code Sequences for more information.

5.13.1 Code Sequences



In ESSI and EIA options it is possible to modify the code sequences, which are added to the beginning and the end of certain actions, when saving files.

The caption of the upper frame shows which actions sequences are currently being modified (e.g. in the picture above they are the sequences of gas cutting). Start and end sequences can be seen in the edit fields. Some actions need the specification of the kerf side (e.g. all cutting sequences).

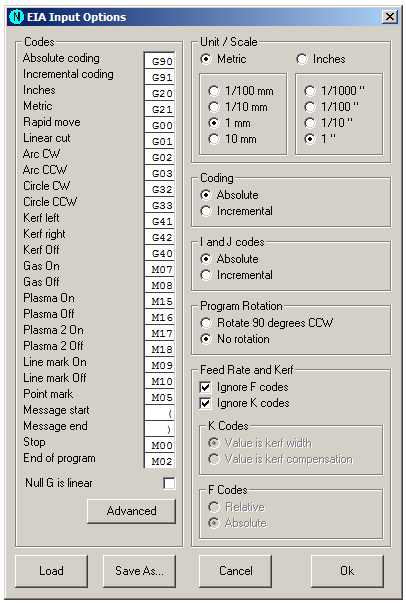
Sequence	Explanation - The beginning and the end of...
Program	...a cutting program
Gas Cutting	...a profile to be cut with gas torch
Plasma	...a profile to be cut with plasma torch. Not supported at the moment
Plasma 2	...a profile to be cut with plasma 2 torch. Not supported at the moment
Line Marking	...a single line marking profile
Point Marking	...a single point marking
Line Marking Block	...all line markings
Point Marking Block	...all point markings

Example

The picture above shows the gas cutting sequences of ESSI files. Kerf side is set to the left. The start sequence is 6 (rapid move off), 29 (kerf left), 7 (gas cutting on). The end sequence is 8 (gas cutting off), 38 (kerf off), 5 (rapid move on). With these settings the following code is generated:

6	(start sequence)
29	(start sequence)
7	(start sequence)
++1000	(a profile)
+1000+	(a profile)
+-1000	(a profile)
-1000+	(a profile)
8	(end sequence)
38	(end sequence)
5	(end sequence)

5.14 EIA input Options



These options are used when ProMotion® Nest reads EIA files.

Codes

EIA files are interpreted according to these codes. These codes should match the codes used in the EIA file.

Null G is linear

When this option is set, ProMotion® Nest interprets lines without G-codes as linear movement. If the cutting is on, then it is linear cutting, otherwise it is just rapid movement. When this option is not set, lines without G-codes are interpreted as the same type that was the last read G-code.

Unit / Scale

These options set the default units and scale used in EIA files. If an EIA file has unit definition, then that overrides this setting. The scale is always defined here.

Coding

If coding is set to absolute, then all X and Y coordinates are absolute. Otherwise they are incremental.

I and J codes

I and J codes are the coordinates of the center point of an arc. If set to absolute all I and J codes, as well as X and Y codes, are absolute, if not they are incremental. If X and Y codes are set to incremental then I and J are also incremental.

NOTE!
"Coding" and "I and J codes" have effect only when they are not defined in the EIA file.

Program Rotation

If rotation is selected, then all new nestings read from EIA files are rotated 90 degrees counter clockwise.

Feed Rate and Kerf

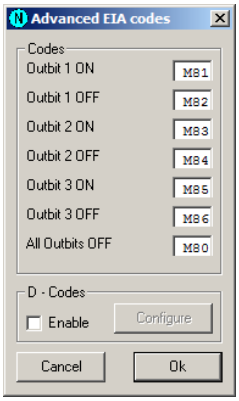
- Ignore F codes If this option is set, then all F codes (feed rates) are ignored when reading files.
- Ignore K codes If this option is set, then all K codes (kerf) are ignored when reading files.
- K Codes
  a. Value is kerf width If this option is set, then the value of the K code is interpreted as kerf width.
  b. Value is kerf compensation If this option is set, then the value of the K code is interpreted as kerf compensation.
- F Codes
  a. Relative If this option is set then F codes are interpreted as percentage of the full feed rate.
  b. Absolute If this option is set then F codes are interpreted as millimeters or inches per minute.

Load & Save As...

If you need to read different EIA files from different sources it is useful to save the settings for each EIA type separately. Save the settings by using the Save as button and load them back with the Load button.

See also EIA Programming.

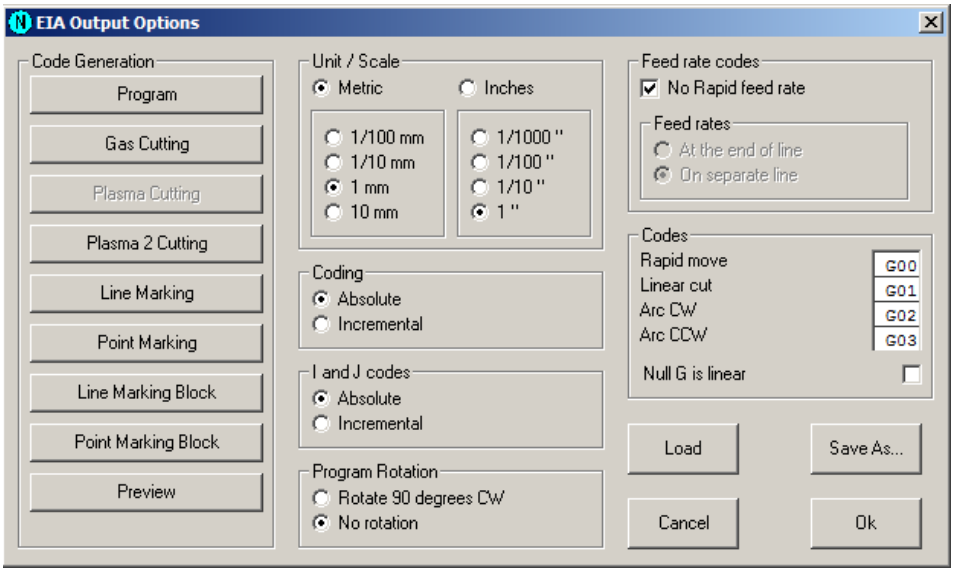
5.14.1 Advanced EIA



Here you can configure the outbits for EIA input. The meaning of these outbits are explained in the ProMotion® Cut manual.

D codes are predefined kerfs used in some systems. Choose Configure to change the kerf values of D codes.

5.15 EIA Ouput Options



These options apply to the saving of EIA files.

Code Generation

Use these commands to define start and end sequences of different actions. See Code Sequences for more information.

Unit / Scale

These options set the unit and scale used in saved EIA files.

Coding

If coding is set to absolute, then all the X and Y coordinates are absolute. Otherwise they are incremental.

I and J codes

I and J codes are the coordinates of the center point of an arc. If set to absolute, all I and J codes are absolute. Otherwise they are incremental. If X and Y codes are set to incremental, then I and J are also incremental.

Program Rotation

If rotation is selected then all generated EIA files are rotated 90 degrees counter clockwise.

Feed rate codes

- No Rapid feed rate If this option is set, then feed rates are not saved for rapid speed.
- Feed rates at the end of line/on separate line Feed rates can be saved on their own lines or at the end of a code line. This option determines which way is used. See examples below.

Example 1 (at the end of line):

G01 X10 Y10 F200

Example 2 (on separate line):

F200

G01 X10 Y10

Codes

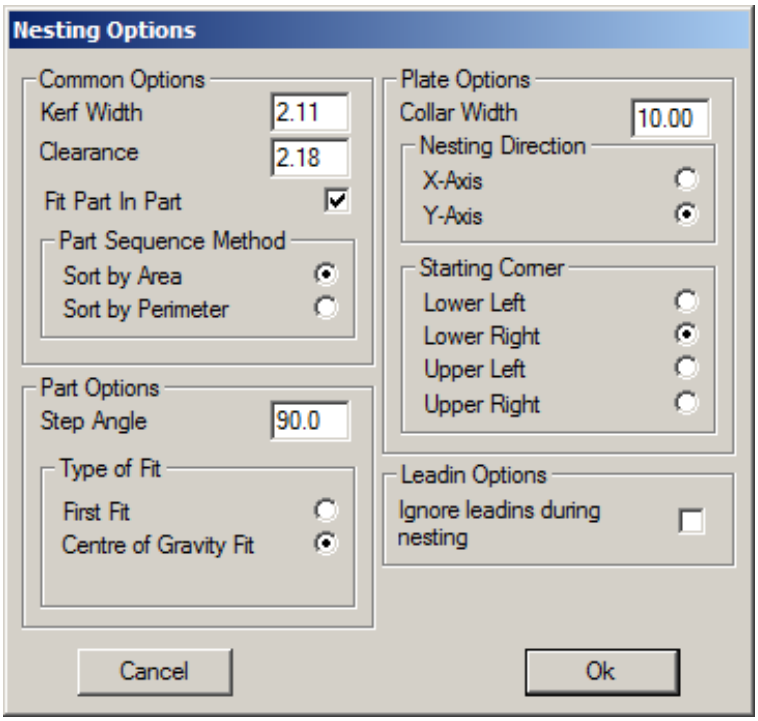
Rapid move, Linear cut, Arc CW and Arc CCW set the codes, which are used when saving EIA files. If Null G is linear is selected, then there will be no code before rapid movement or linear cut.

Load & Save As...

If you need to save different EIA files from different sources which use various types of EIA, it is useful to save the settings for each EIA type separately. Save the settings by choosing Save as and load them back by choosing Load.

See also EIA Programming.

5.16 Nesting Options



Common options

- Kerf width The kerf width of the selected cutting process.
- Clearance Specifies the minimum distance always to be left between shapes nested on a plate. If this variable is set to zero (0), the program places them as close to each other as the kerf width allows.
- Fit Part in Part If selected, the program will attempt to place smaller shapes to the holes of the larger ones.
- Part sequence method Shapes can be nested either in an order set by their surface area or their perimeter. If sort by area is chosen, then those shapes that have largest surface area will be nested first. When sort by perimeter is chosen, the shapes which have largest perimeter will be nested first. (A shape which is long, but thin, has a great perimeter, but a small surface area.)

Part Options

- Step angle When nesting shapes onto a plate, ProMotion® Nest attempts to place them on it in different positions. Between each attempt, ProMotion® Nest rotates the shapes as many degrees as given here. A full circle is 360 degrees. Thus, if this variable is set to 90, the shapes will be attempted to nest in four different positions; if set to 1 degree ProMotion® Nest tries 360 different positions. Obviously, the smaller the step angle, the better the result, but a small step angle naturally extends the nesting time.
- Type of Fit Shapes can be nested according to two principles, the First Fit and the Center of Gravity Fit. The First Fit setting tells ProMotion® Nestto place the shape in the first position it determines will work. The Center of Gravity Fit setting tells ProMotion® Nest to calculate the position where the center of gravity of the shape is as close to the bottom line of the plate as possible. The bottom line of the plate is selected in the Plate Options (see below).

Plate Options

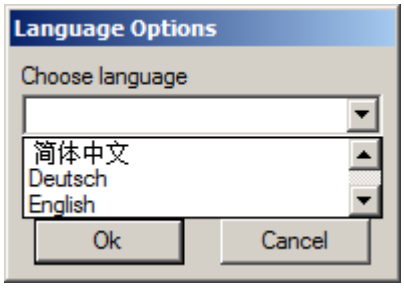
- Collar width Sets the distance to be left between the plate's edges and the outermost shapes. In other words, shapes are never to be placed closer to the edge of the plate than stated in this variable.
- Nesting direction This option sets the axis on what the nesting process proceeds. Whether the nesting process proceeds to the left or the right depends on the starting corner setting.
- Starting corner Determines which corner the nesting begins at.

NOTE!
If Clearance is greater than Collar width, then Collar width is set to same as Clearance.

Leadin Options

- Ignore leadins during nesting When selected all leadins and leadouts are ignored during the nesting process. This is a useful option if shapes are going to be nested and then bridged. Bridging removes extra leadins that can be ignored.

5.17 Language Options



Changes the language used by the user interface of ProMotion® Nest.

5.18 Registration Menu

Tools to register your ProMotion® Nest software.

5.18.1 Registration Form

Please fill this out form to order software or new software options.

It is also recommended to use this form if you have some technical problems, especially license related.

5.18.2 Registrate

Use this dialog to enter your new license number. If you received your new license as a license file simply copy that file to the ProMotion® Nest directory. If you received the license by fax, then you should fill in the form carefully and completely.

5.19 Help Menu

Help menu has the following items:

- Contents Opens the help file on your screen.
- About... Provides information about your version of ProMotion® Nest software.

5.20 List Windows

There are two list windows on the right hand side of ProMotion® Nest user interface. Those windows are Plate List and Part List. They both offer several tools for your use.

5.20.1 Plate List

This window contains a list of all plates, which are opened. The list is sorted alphabetically. The active plate has a blue bar on it (it is selected). These tools are available in the plate window:

Activate - Click the name of the plate to activate it.

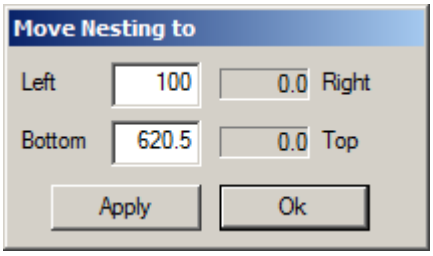
Nest - Double-Click the name of the plate and it will be automatically nested.

Popup menu - Right-Click the window to open a popup menu. The menu contains following commands:

- New Plate Creates a new plate
- Change plate Changes the plate's size.
- Trash Trashes the current plate and the nesting in it.
- Rename Renames the current plate.
- Nest Automatic nesting on the current plate
- Move Nesting to (see below)
- Marking Text Activates the marking text tool.
- Print Extras (see below)

Move Nesting to

This tool changes the position of the whole nesting. When you select this tool, the window below appears.

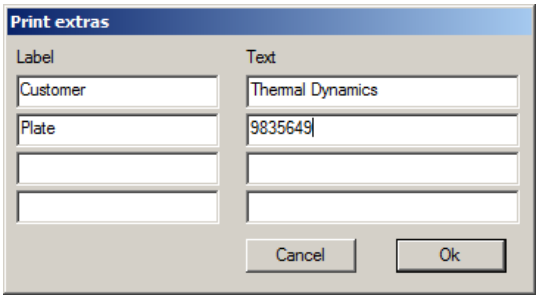


Left is the nestings distance to the left side of the plate. If this number is negative, it means that the nesting is over the plate's edge. Right, bottom and top work in the same way.

You can change left and bottom values. When you choose "APPLY" the nesting moves and the values (right and top) in this window are updated. "OK" is like "APPLY" but it also closes this window.

Print Extras

Use this tool to add your own notes at the end of print sheet. When you print a nesting, these four lines will be at the bottom of the sheet.



5.20.2. Part List

This window contains a list of all geometries, which are opened. The list is sorted alphabetically. The active geometry has a blue bar on it (it is selected).

These tools are available in the geometry window:

Activate - Choose the name of the geometry to activate it.

Copy to the active plate – Double Click the name of the geometry.

Popup menu – Right Click the window to open a popup menu. The menu contains following commands:

- Open
- Trash
- Rename, which renames the active geometry.
- Copy to nesting, which copies the active geometry to the active plate.
- Move shapes to origin moves the nesting so that it's minimum X and Y values are equal to zero.
- Add plate creates a plate, puts the nesting on that and moves the job to the plate list (plate window).
- Toggle Group On/Off toggles the status of the active geometry (geometries) to group or to normal. If there is an asterisk (*) before the name of the geometry, then it is considered as a group.
- DSTV properties shows a little window, which displays data read from a DSTV file.
- Nominal size is by default the part's width x part's length. This opens a dialog box, which shows the part's nominal size and you can change it, if you wish. Nominal size is used in NestInfo.
- Marking Text

5.21 Miscellaneous

5.21.1. Terminology

Nesting

Nesting is divided in the following way:

Element is the atom of a nesting. Element is the smallest part that can be edited. There are four different kinds of elements: lines, arcs, circles and points.

Profile is a combination of one or more elements, which are connected to each other. At the starting point of a profile the sheet is pierced and cutting starts. At the end point of a profile the torch is raised up and cutting stops.

Shape contains one or more profiles. Shape is a logical part, which has a boundary and possibly has some holes.

Nesting contains all the shapes, but can also be empty.

Transferline

Transferline is a path that the torch follows when it is not cutting.

5.21.2. Problems?

We have listed here some problems, which occur time to time, and solutions to them.

1. When starting ProMotion® Nest displays the following message “Registration error! Please, contact your dealer. Running in demo mode.” and starts in the demo mode.

OFFICE PC:

ProMotion® Nest requires an activation file (license.txt) and a dongle to work. Please check the following things:

- The dongle is plugged into the PC’s USB or LPT port.
- You have installed drivers for the dongle.
- There is a license file (license.txt) in the ProMotion® Nest folder.

If all of the above are ok, then there may be something wrong with your license file. Please contact your dealer.

ICNC CONTROLLER:

Try to close ProMotion® Nest and then start it again. If that didn’t help, please contact your dealer.

5.21.3. DXF

Overview

DXF format is supported by most present day CAD softwares. DXF files can be either ASCII or binary formats. Because ASCII DXF files are more common than the binary format, the term DXF file is used to refer to ASCII DXF files.

Requirements and Recommendations

DXF files are an interface between CADs and nesting software, like ProMotion® Nest. There are certain recommendations and requirements when creating and converting DXF to ProMotion® Nest, which should be noticed:

- It is useful to put geometries on their own separate layer and name that layer so that it is easily recognized (e.g. PROFILES). ProMotion® Nest detects different layers and allows the user to choose which layers to load.
- If there are multiple parts, it is a good idea to put each of them on their own separate layer (e.g. PART1, PART2, etc.).
- Line and point markings must be placed on their own layers. Use POINT or CIRCLE entities for point marking.
- Draw the parts in 1:1 ratio. Do not scale them. ProMotion® Nest reads the coordinates as they are in a DXF file.
- Try to avoid open gaps between different elements. Use POLYLINE or other objects that draw a continuous line.
- All marking objects (point marking, line marking or text objects) must be inside parts. Outside objects are ignored.
- Supported objects are LINE, ARC, SPLINE, CIRCLE, POINT, POLYLINE, VERTEX, ELLIPSE, TEXT, MTEXT and SEQEND.

Unsupported CAD features

- DWG or binary DXF files are not supported at all.
- Other unsupported objects are INSERT, IMAGE and HATCH. There are others too, but these are the most common.

Additional Notes

- ELLIPSE objects are converted to lines with maximum allowed error of 0.1 mm. The error level can be adjusted in ini files..
- Marking text (TEXT and MTEXT objects) requires the optional “Advanced Marking” software module.
- Scanned drawings which are converted to DXF, usually make poor CNC code. The scanner generates unnecessary short lines e.g. a one-inch long straight line may be formed of one-hundred 0.01” lines. Often times the lines may be too short to be accepted at all. When that happens ProMotion® Nest leaves empty gaps in those places indicating an open profile, which cannot be nested until all entities are joined. That is time consuming and in-efficient. This will cause much larger CNC files to be generated, which leads to longer operation time at the CNC controller.

When using scanned drawings build them with as long elements as possible.

5.21.4. CNC-2

We have developed an advanced CNC-language - Robotic CNC-2. CNC-2 is more accurate than old Robotic CNC-, ESSI- or EIA-languages. So far ProMotion® Nest is the only software that supports CNC-2.

CNC-2 is an excellent choice for making backup copies. It saves not only the nesting, but also the plate.

5.21.5. Line and Point marking

If a nesting contains line or point markings, they are merged to the shapes of the nesting. You cannot add, move or alter the markings, unless you also move the shapes. The only thing you can do to the markings themselves is to remove them.

When ProMotion® Nest generates cutting program, it will place possible markings before the cutting in the cutting order. That means: if shape contains line or point markings, the markings will be done first and the cutting is done after the markings.

The line marking profiles are drawn in black color.

The point marking points are drawn as black circles with a cross inside the circle.

5.21.5. EIA Programming

About functions

There are two types of functions. Those which define movement of the cutter and those which define some other specific action (i.e.: “torch on”). All functions have a certain identifier, which can be changed in EIA options (see ProMotion® Nest’s options). Syntax of functions:

Key to syntax:

ID is a string that defines the function.

X, Y, I and J are coordinates. Character X, Y, I or J must be first and immediately after them should the coordinates follow (like X123.456 Y-12.3 I1234 J0).

Rapid movement: ID X Y

Linear cut (line): ID X Y

Arc: ID X Y I J

Circle: ID I J

All other functions: ID

Example 1

(Comments are in parenthesis)

G90

(Absolute mode)

G21

(Use metric units (millimeters))

G00X100Y300

(Move to point 100, 300)

G41

(Kerf compensation left)

M03

(Gas torch on)

G01X100Y400

(Linear cut to point 100, 400)

G02X200Y400I150J400

(Clockwise arc to point 200, 400 arc's center at position 150, 400)

G32I150J350

(Clockwise circle of radius 50 and center at position 150, 350)

M05

(Gas torch off)

M02

(End of program)

Example 2

G00X100Y100

M03

G32I50J0

M05

M02

As you can see there is no definition of the kerf compensation, programming mode or units' type. In this case the defaults are used. The defaults can be set in ProMotion® Nest's EIA options. Let us assume that the programming mode is absolute, but I and J codes are incremental and units are millimeters. In that case the program would create a circle which center would be at position 150 (100+50), 100 (100+0). If I and J codes would also be absolute then the center of the circle would be 50, 0.

5.21.7. SendTo

If you add a shortcut to ProMotion® Nest into Windows' Send To folder, you can send files to ProMotion® Nest directly from the Windows Explorer.

5.21.8. ini files

In the folder where ProMotion® Nest is installed, there is a folder named ini. That folder contains some configuration files, which are really useful in some cases.

The format of each ini file is the same. The format is:

ID, TYPE, DATA, INFO

ID is the identification number of that setting. Do not change it!

TYPE is the type of the DATA. Do not change it!

DATA is the actual setting. You can modify this.

INFO is a short description of the setting. You can modify this, if you want to.

This is an example from tools.ini

10,1,1,DNC COM Port [default: 1]

ID = 10

TYPE = 1

DATA = 1

INFO = DNC COM Port [default: 1]

A brief description of some ini files:

tools.ini is probably the most important of ini files. There you can change the behavior of some tools and set some error margins. The settings here are such that you shouldn't need to touch these in most of the cases. These settings are for special cases where standard is not working well enough.

ui.ini contains some settings related to the user interface.

5.21.9. Command line parameters

There are a couple of command line parameters which can be used when starting ProMotion® Nest.

-min Starts the software with its window minimized.

-is This parameter must be used with a cnc file. When using this parameter ProMotion® Nest reads the file in with raw import. After that it sends the file to cutting, trashes the nesting and minimizes itself. This parameter is useful only when using an iCNC controller.

Example of usage:

pmnest.exe -is C:\CuttingPrograms\testFile.eia

This Page Intentionally Blank

SECTION 6: MAINTENANCE AND TROUBLESHOOTING

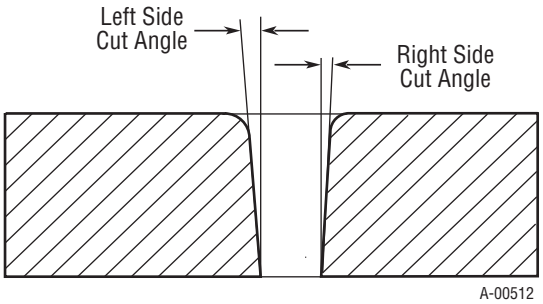
6.1 Maintenance

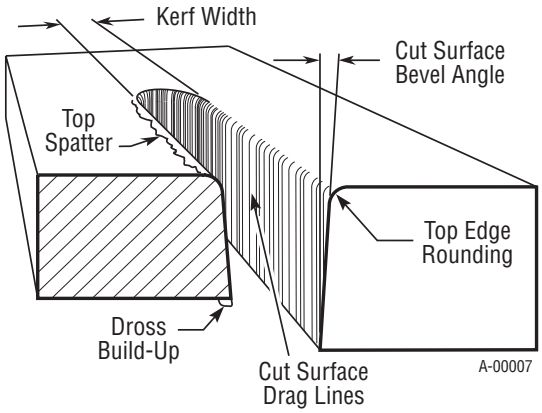
Weekly	Check buttons for wear and tear.
Monthly	Check cables for wear and tear. Check all connectors are properly connected.
	Clean and check rails
	Clean lifter screw and rails

6.2 Cut Quality

Cut Quality

Cut quality requirements differ depending on application. For instance, nitride build-up and bevel angle may be major factors when the surface will be welded after cutting. Dross-free cutting is important when finish cut quality is desired to avoid a secondary cleaning operation. Cut quality will vary on different materials and thicknesses.





Cut Surface

The condition (smooth or rough) of the face of the cut.

Bevel Angle

The angle between the surface of the cut edge and a plane perpendicular to the surface of the plate. A perfectly perpendicular cut would result in a 0° bevel angle.

Top-Edge Rounding

Rounding on the top edge of a cut due to wearing from the initial contact of the plasma arc on the workpiece.

Dross Build-up and Top Spatter

Dross is molten material which is not blown out of the cut area and re-solidifies on the plate. Top spatter is dross which accumulates on the top surface of the workpiece. Excessive dross may require secondary clean-up operations after cutting.

Kerf Width

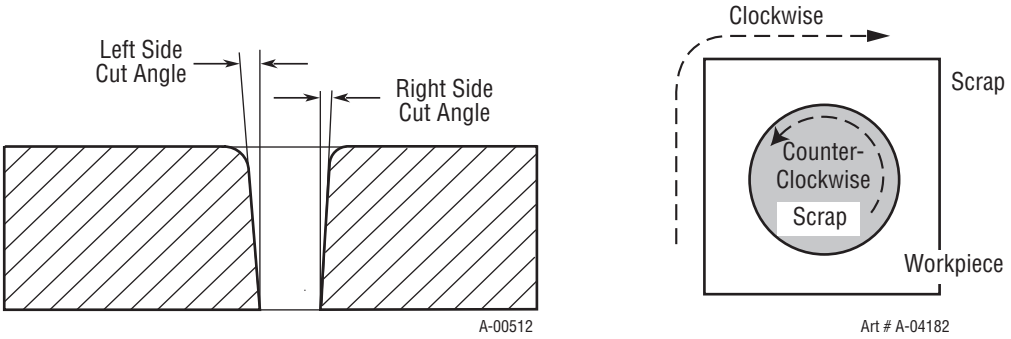
The width of material removed during the cut.

Nitride Build-up

Nitride deposits which may remain on the cut edge of the carbon steel when nitrogen is present in the plasma gas stream. Nitride buildups may create difficulties if the steel is welded after the cutting process.

Direction of Cut

The plasma gas stream swirls as it leaves the torch to maintain a smooth column of gas. This swirl effect results in one side of a cut being more square than the other. Viewed along the direction of travel, the right side of the cut is more square than the left.



Swirl Effect on Side Characteristics Of Cut

To make a square - edged cut along an inside diameter of a circle, the torch should move counterclockwise around the circle. To keep the square edge along an outside diameter cut, the torch should travel in a clockwise direction.

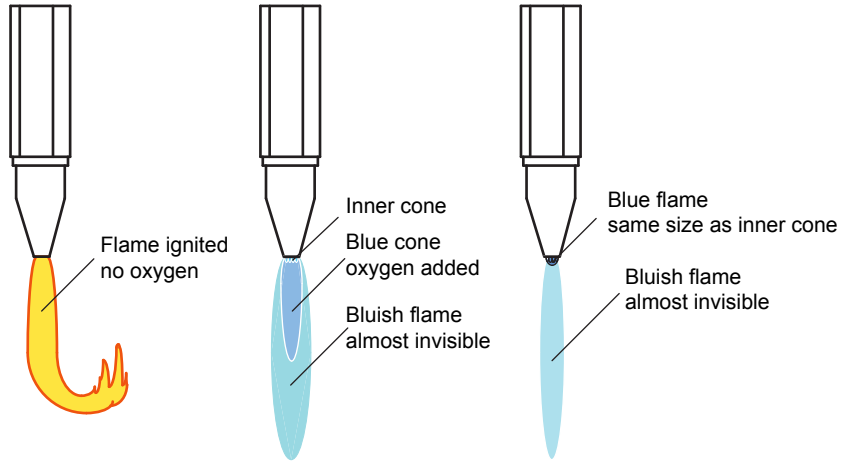
6.3 Oxy fuel cutting quality

Note!

Always follow manufacturers guide lines on adjustments and cutting parameters.

6.3.1 Igniting and adjusting a neutral flame

1. Ignite the flame
2. Add gas until the flame separates from the tip and then slowly decrease the gas until the flame touches the tip again.
3. Slowly start to add oxygen and watch the inner cone, the blue inner cone will start to shorten as you increase the oxygen flow. Increase the oxygen until the inner cone reduces to the same length as the small preheat flame.
4. At this point the flame temperature and intensity is at its maximum.



6.3.2 Effect of preheat on cut quality

Characteristics of proper preheat:

1. Top edge is quite square, and less than 1/16-2” melt over (top rounding).
2. Face of the cut contains an easily removable thin layer of slag which covers a clean surface with well defined drag lines from top to bottom.
3. Bottom edge contains little to no easily removable slag.

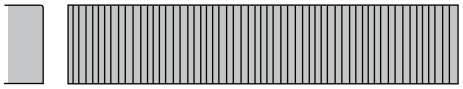
Characteristics of too much preheat:

1. Top edge contains heavy roll over and occasional protrusions.
2. Black heavily crusted slag will accumulate on the face of the cut, making it difficult to clean.
3. Upper portion of cut has little to no drag lines and lack of detail because of melting.

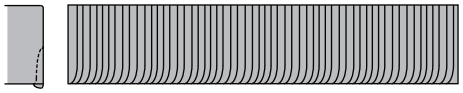
Characteristics of too little preheat:

1. Top edge is almost perfectly square.
2. Torch is constantly on the verge of losing cut.
3. Some difficulty is experienced in getting through heavy plate.

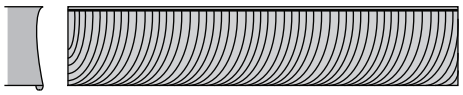
Correct cutting technique
The cut surface is smooth and square, and the kerf walls are parallel. The lag lines are almost vertical. There is little slag adhering to the bottom edge. The top edge is slightly rounded when the preheat flames are properly adjusted. This surface is ideally suited for many applications without further treatment.



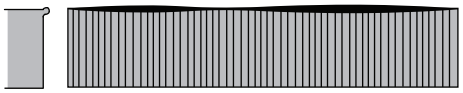
Cutting speed too low
An abnormally low cutting speed results in heavy gouging of the cut surface and slag adhering in large globules. Under this condition, oxygen and fuel gas are being wasted.



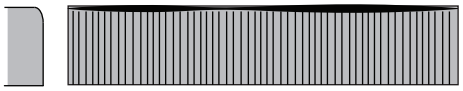
Cutting speed too high
An extremely high cutting speed results in heavy lag, as shown by the curved lag lines on the cut surface. The face is reasonably smooth but somewhat concave. Slag will adhere during cutting, but it may be removed with ease. Heavy lag cutting is recommended for straight line cuts only.



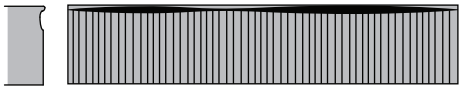
Nozzle too far from surface
When carrying the nozzle too high above the work, excessive rounding of the top edge occurs. Also, the cutting speed may have to be lowered. With the correct nozzle clearance, the preheat flames should not be over 1/4” above the top surface of the work.



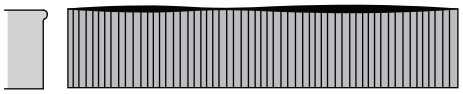
Nozzle too near surface
When the nozzle is carried too low, part of the preheat flame’s inner cones become buried in the cut kerf. This produces grooves in the cut face and excessive melting of the top edge. Also, the flame becomes subject to popping and lost cuts may result.



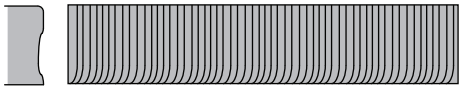
Excess cutting Oxygen
If the cutting oxygen pressure is too high or the nozzle size too large, a reduction in cut quality will result. Nozzles are made to operate within a limited range of torch pressures. Therefore, excessive oxygen pressure causes distortions in the oxygen stream once it leaves the nozzle.



Excess preheat flame
Inexperienced operators often try to increase cutting speeds by using a heavy preheat flame. Excessive preheat causes melting of the top edge and may actually lower the speed of cutting. In addition, oxygen and fuel gas are wasted.



Dirty nozzle used
The nozzle has been fouled by some adhering scale causing the oxygen stream to lose its parallel form. The cut surface is no longer smooth or squared with proof of pitting, undercutting, heavy slag and scale. The nozzle should be cleaned with care, so as not to distort, or bell-mouth, the cutting oxygen bore.



6.4 Troubleshooting

6.4.1 Error messages

Problem	Cause	What to check
Limit switches	Limit switch active	Drive machine out from limit switch
	Broken cable	Cable for wear and tear
	Broken switch	Measure proper operation of switch
Collision	Torch collision active	Seat torch holder properly
	Broken cable	Cable for wear and tear
	Broken switch	Measure proper operation of switch
No inbit 04	Plasma did not fire	Check troubleshooting for piercing issues
Main arc on Rapid motion	Torch ON while traversing	Check plasma off delays
No motion detected	Enable button set to OFF	Put Enable button to ON
	No power to servo	Check that servos are powered
	E-stop pressed in	Check external stop buttons
System halted all outputs disabled	E-stop pressed in	Check external stop switches/buttons. Check continuity between E1 and E2 in the power connector.

6.4.2 Piercing issues

Problem	Cause	What to check
Plasma will not pierce	Worn out consumables	Check consumables
	Error in Plasma	Check plasma power supply for eror messages.
	Plasma start time set too short	Check plasma start delay time
	Plasma set to off	Check plasma button is on Auto
Plasma starts but crashes to plate	Worn out consumables	Check consumables
	Error in Plasma	Check plasma power supply for eror messages.
	AVC set too low	Check arc voltage setting
	Collision rebound offset set too low	Check collision rebound ofset setting on iHC
Plasma arc lost in the middle of a cut	Worn out consumables	Check consumables
	Error in Plasma	Check plasma power supply for eror messages.
	Wrong gas pressures	Check plasma gas pressures

6.4.3 Motion issues

Problem	Cause	What to check
Motors won't move	Enable OFF	Turn enable switch to ON
	SW Enable OFF	See error messages.
	Speed set to 0	Turn the speed potentiometer to 100%, press the speed up button to increase the speed.
	External stop active	Check continuity between E1 and E2 in the power connector.
Motors move slowly	Limit switch tripped	Check limit switches
	Collision tripped	Check collision sensor
	Speed set to low	Turn the speed potentiometer to 100%, and/or press the speed up button to increase the speed.

6.4.4 Boot and power issues

Problem	Cause	What to check
Unit will not power up	No main power	Measure 24VDC power input, replace power supply.
	Poor power connection	Check for proper power connector connection.
	Over current fuse tripped	Remove all cables, leave power off for 1min. Connect only the power cable and try to boot. If CNC powers up connect cables 1 at a time to find out which one is causing the issue.
Unit shuts down during IHS Start	Poor input power	Check that power supply is rated minimum of 6.5A. Check that voltage does not drop during rapid torch movement.
Unit will not boot (white screen)	Temperature too low	Check that temperature is inside specs. Wait until system warms up.
Unit will not boot to windows	Bios settings lost	Change correct bios settings, see service manual for correct bios settings.
Data on the screen fills only part of the screen	Bios settings lost	Change correct bios settings, see service manual for correct bios settings

6.5 Replacement parts

Item	Name	Part number
Power Supply	24VDC PSU	15-6025
Lifter motor	Stepper motor	15-2044
Lifter axis coupler	Axis coupler	15-XXXX
Collision sensor	Inductive sensor 1pc.	15-2119
Collision sensor cable	Inductive sensor cable 1pc.	15-2114
Laser pointer	Laser pointer	15-2091
Voltage divider board	Voltage divider board	15-5005
Nema23 motor		15-6002
Nema23 gearbox		15-6003
Nema34 motor		15-6004
Nema34 gearbox		15-6005
Power supply 75VDC		15-6019
Servo adpater card		15-6021

This page intentionally blank.

THE AMERICAS

Denton, TX USA
U.S. Customer Care
Ph 1-800-426-1888 (tollfree)
Fax: 1-800-535-0557 (tollfree)
International Customer Care
Ph 1-940-381-1212
Fax: 1-940-483-8178

Oakville, Ontario, Canada
Canada Customer Care
Ph 1-905-827-4515
Fax: 1-800-588-1714 (tollfree)

EUROPE

Chorley, United Kingdom
Customer Care
Ph +44 1257-261755
Fax: +44 1257-224800

Milan, Italy
Customer Care
Ph +39 0236546801
Fax: +39 0236546840

ASIA/PACIFIC

Cikarang, Indonesia
Customer Care
Ph 6221-8990-6095
Fax: 6221-8990-6096

Rawang, Malaysia
Customer Care
Ph +603 6092-2988
Fax: +603 6092-1085

Melbourne, Australia
Australia Customer Care
Ph 1300-654-674 (tollfree)
Ph 61-3-9474-7400
Fax: 61-3-9474-7391
International
Ph 61-3-9474-7508
Fax: 61-3-9474-7488

Shanghai, China
Sales Office
Ph +86 21-64072626
Fax: +86 21-64483032
Singapore
Sales Office
Ph +65 6832-8066
Fax: +65 6763-5812

THERMAL DYNAMICS

INNOVATION TO SHAPE THE WORLD™

U.S. Customer Care: 800-279-2628 / FAX 800-535-0557
Canada Customer Care: 905-827-4515 / FAX 800-588-1714
International Customer Care: 940-381-1212 / FAX 940-483-8178

© 2015 Thermal Dynamics Corp.

Printed in Finland